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COMMUNICATIONS

THE FUNDUS AND FOVEA CENTRALIS OF THE ALBATROSS (DIOMEDEA CAUTA CAUTA—GOULD)*

BY

KEVIN O'DAY

MELBOURNE

"And a good south wind sprang up behind;
The Albatross did follow,
And every day, for food or play,
Came to the mariners' hollo!"

COLERIDGE.

THE general fundus reflex of the eye of the Albatross is a dark grey merging into a delicate shade of pink at the lower periphery (Fig. 1). The grey surface is covered with innumerable, glistening, white spots. The only vessels to be seen are choroidal running up a little way from the lower periphery in indistinct parallel lines. The margin of the optic nerve entrance is visible as a white crescent around the upper part of the base of the pecten. The latter structure projects well forwards into the vitreous and it is with difficulty that one may catch glimpses of the fundus past its peripheral extremity. It consists of nine fan-like folds increasing in size from the centre to the periphery. The fringe of the smaller central folds has a translucent brown

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appearance and a distinct ridge is visible along the summit of the pecten. The site of the fovea cannot be definitely determined, although a small circular area of darker colour than the rest of the fundus, is to be seen to the nasal side of the upper part of the base of the pecten. The bird expresses its resentment at the ophthalmoscopic examination of this area by becoming restless and trumpeting loudly.

The fixed specimen (Fig. 3) reveals the presence of a well-marked, elevated, central strip with a single oval fovea to the nasal side of the pecten. The central strip is 1·75 mm. wide and the oval fovea approximately the same width, the central strip bulging to accommodate it. The angle between the central strip and the major axis of the optic nerve entrance—the *infulo-papillary angle* (Casey Wood) is 75.[3] The base of the pecten overlaps the edges of the optic nerve entrance. Viewed from the lateral aspect it is quadrilateral in shape with a curved base of 10 mm., an apex of 5 mm., a central edge of 7 mm., and a peripheral of 6 mm. (Fig. 5).

The fundus reflex of the eye of the Giant Petrel (*Macromectes Giganteus Giganteus*—Gmelin) is a darker grey than that of the Albatross (Fig. 2). The margin of the base of the pecten is completely surrounded by a white border, which in its turn is almost completely separated from the rest of the fundus by what appears to be a choroidal blood sinus with vessels radiating from it. Other choroidal vessels run up from the lower periphery. The folds of the pecten are placed further apart than in the Albatross and terminate in a little tail. The fovea cannot be easily recognised. Examination of the fixed specimens shows a central strip and fovea as in the Albatross (Fig. 4). The base of the pecten does not extend to the edge of the optic nerve entrance, and the tail of the pecten is a continuation of the apical ridge.

The chief dimensions of the eye of the Albatross are as follows:

Antero-posterior diameter	21 mm.
Equatorial diameter	26 mm.
Limbal diameter	12 mm.
Depth of anterior chamber	2-3 mm.
Lens—Transverse diameter	10 mm.
Antero-posterior diameter ...	5 mm.
Pad	1·5 mm.

These measurements taken on the fixed eye are only approximate, as the cornea of the specimen examined was distorted by the contraction of the nictitating membrane during fixation. The bird is the size of a large goose.

FIG. 1.

Fundus of the right eye of the Albatross (*Diomedea cauta cauta—Gould*). Ophthalmoscopic view.

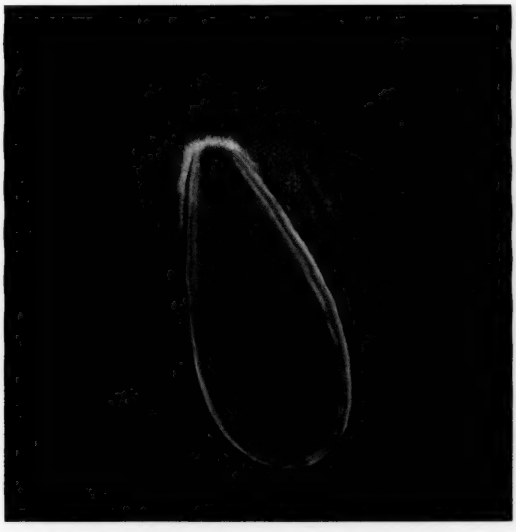

FIG. 2.

Fundus of the right eye of the Giant Petrel (*Macromectes giganteus giganteus—Gmelin*). Ophthalmoscopic view.

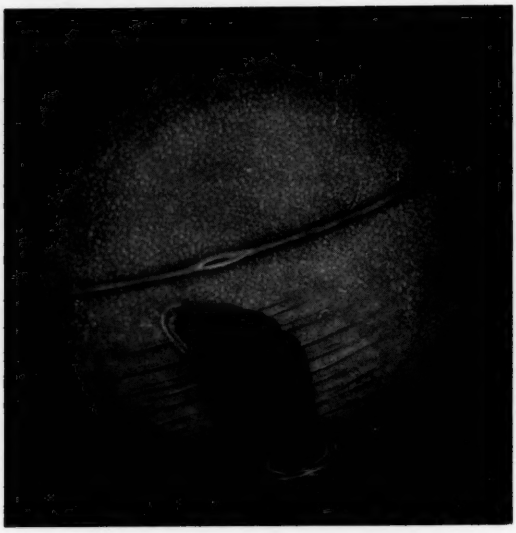

FIG. 3.

Fundus of the right eye of the Albatross (*Diomedea cauta cauta—Gould*). Fixed specimen.

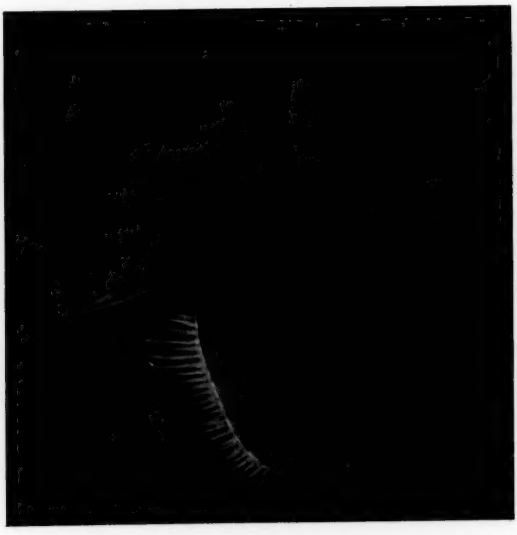

FIG. 4.

Fundus of the left eye of the Giant Petrel (*Macromectes giganteus giganteus—Gmelin*). Fixed specimen.

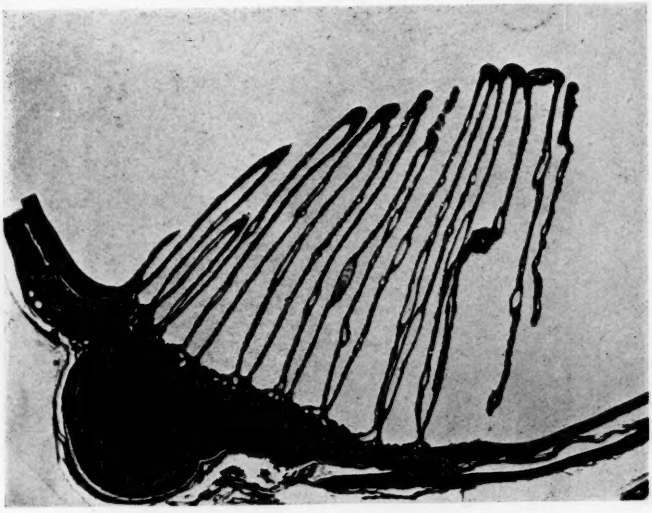

FIG. 5.

Pecten of Albatross. ×6.

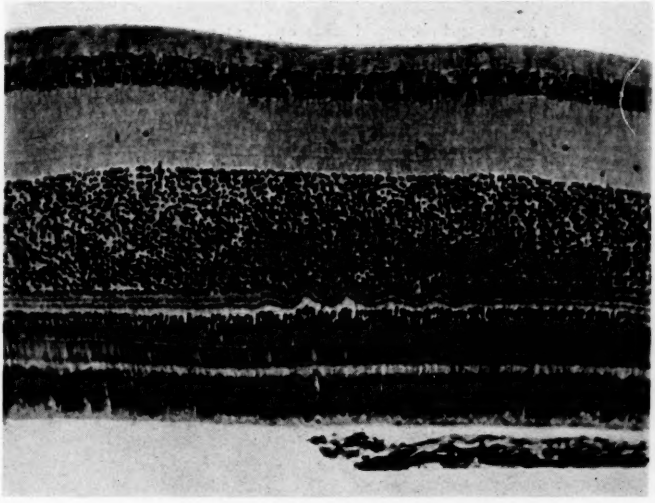

FIG. 6.

Temporal edge of fovea of Albatross. ×150.

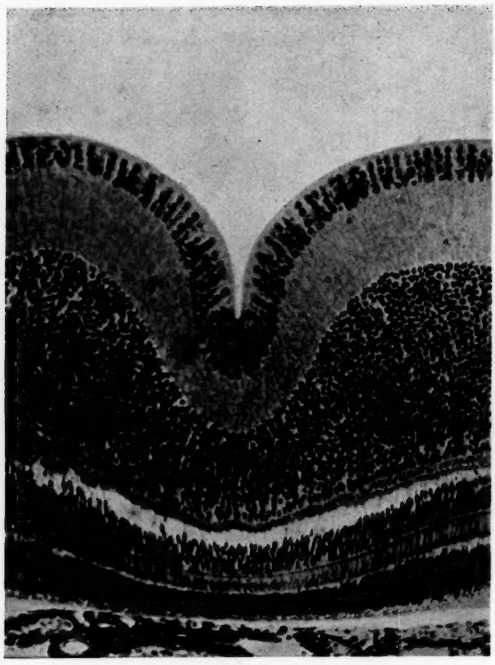

FIG. 7.

Para-central section of fovea of Albatross. ×150.

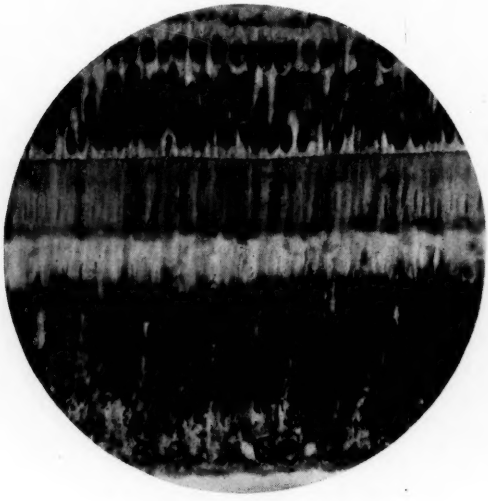

FIG. 11.

Visual cells and pigment epithelium of the Albatross. ×700.
" Rods " and " cones " of Albatross. (Para-foveal).

The globes were fixed by injecting the vascular system of the bird with Kolmer's fixative immediately after asphyxiation with coal gas. One globe was embedded in celloidin and sections were prepared and stained with iron haematoxylin and phloxine as well as with Mallory's connective tissue stain. A few sections were bleached with " Diaphanol " to reveal the structure of the outer segments of the visual cells.

Examination of the retina with the low power reveals many local differences of structure to correspond with the macroscopic view of the fixed specimen. In general the architecture is typically avian, with a thick layer of bi-polar cells, glial masses in the outer reticular layer, a double layer of outer nuclei and a dense layer of pigment concealing the distal extremities of the outer segments of the visual cells. Along the central streak the retina is thicker than elsewhere, with a resulting ridge projecting into the vitreous. Here the single layer of ganglion cells is transformed into three, there is an enormous increase in the number of nuclei in the bi-polar layer, the horizontally arranged glial masses disappear from the outer reticular layer, the outer nuclei are increased in number as well as becoming attenuated, and there is a slimming and lengthening of the outer segments of the visual cells. To accommodate this increased lengthening, the external limiting membrane curves inwards, that is, with its convexity towards the vitreous.

The foveal sections were cut at right angles to the central streak. Approaching its edge, there is a sudden very great thickening of the bi-polar layer due to the lateral displacement of cells from the centre of the fovea which causes a ridge to appear around the edge (Figs. 6, 7). This layer dwindles away as quickly as it thickens but does not entirely disappear in the centre three or four cells still remaining. The nuclei of the optic-nerve fibres are arranged in palisade formation in groups of three (Figs. 8, 9). There is no appreciable diminution in the number of nuclei in the outer layer and the dendritic termination of their fibres may be made out. At the edge of the fovea there is a sudden thickening of the layer of synapses as those from the " rods " join in. There is no layer of Henle. The external limiting membrane bends outwards at the centre of the fovea, that is its convexity is towards the sclera. In the same area the outer segments of the cones, which elsewhere are well preserved, are badly distorted and buckled. Kolmer[1] from his own experience and from studying the photomicrographs of other observers comments on the difficulties met with in fixing this interesting area.

" Rods " and " cones " are present throughout the retina except at the centre of the fovea, where only the latter are to be found. The nuclei of both are finely granular, the background of

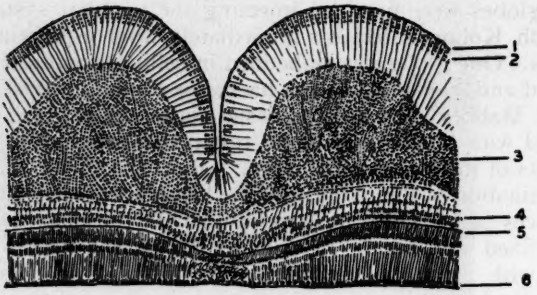

FIG. 8.

Fovea centralis of the Albatross. ×135.

1. Internal limiting membrane.
2. Nuclei of optic nerve fibres.
3. Bipolar cells.
4. Nuclei of "rods" and "cones."
5. External limiting membrane.
6. Nuclei of pigment epithelium.

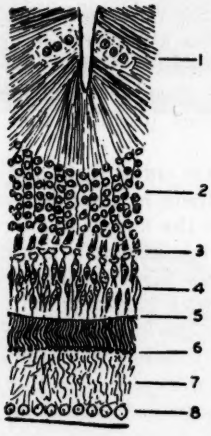

FIG. 9.

Fovea centralis of the Albatross.

1. Nuclei of optic nerve fibres.
2. Bipolar cells.
3. Outer molecular layer,
4. "Cone" nuclei.
5. External limiting membrane.
6. Oil droplets.
7. Outer segments of cones.
8. Nuclei of pigment epithelium.

the latter being a little more deeply staining (Figs. 10, 11). The nuclei of the "cones" are arranged next to the limiting membrane, whilst occasionally in the extreme periphery and in the region of the pecten they are to be found outside it in the accessory

member of the double " cones." Both single and double " cones " are present, the latter being found more easily at the periphery. The proximal part of the myoid of the single cones does not stain well with Mallory or phloxine although there is no definite evidence of the presence of a paraboloid. The distal

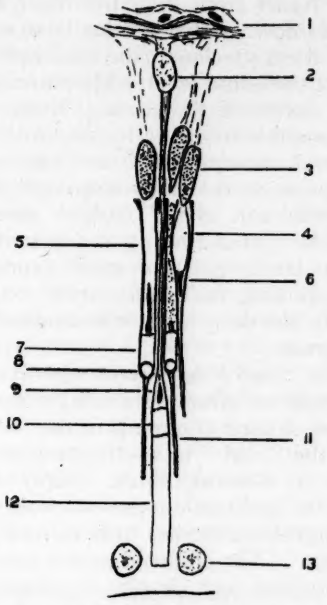

FIG. 10.

Visual cells of Albatross. ×1000.

1. Outer molecular layer.
2. " Rod " nucleus.
3. " Cone " nucleus.
4. Paraboloid.
5. " Cone " myoid.
6. Double " cone."
7. " Cone " Ellipsoid.
8. Oil-droplet.
9. " Rod " myoid.
10. " Rod " ellipsoid.
11. " Cone " outer segment.
12. " Rod " outer segment.
13. Nucleus of pigment epithelial cell.

third is traversed by a centrally situated cylindrical structure terminating abruptly at the deeply staining ellipsoid. The cylinder stains well with the acid fuchsin of Mallory's stain and with iron haematoxylin. The ellipsoid stains a mauve colour with Mallory and pink with phloxine. An oil-droplet is situated at its distal extremity which in its turn gives way to a thread-like outer segment. The chief member of the double " cone " resembles the single " cone " in structure with the exception that the

protoplasm of the myoid is definitely granular. The outer segment of the accessory member contains no oil-droplet. In the fixed condition it contains a greatly elongated, non-staining, oval, structure just outside the limitans—the paraboloid. This is surmounted at its distal extremity by a short cylinder, corresponding in its staining properties with the similar structure in the single cone. Apart from this, the outer segment does not stain well and thins down rather gradually to a thread-like distal extremity. In the fixed specimen, the oil-droplets are of different sizes and not all at the same level. They are still present in the fine cones at the centre of the fovea. Even in thin, bleached sections, it is not possible to determine accurately how far distally the thread-like distal extremities of the " cones " extend. The writer has the impression that they stop well short of the nuclei of the pigment epithelium. The " cones " are shortest and most plump at the periphery of the retina and near the pecten. In the central streak they are longer and more slender. In the centre of the fovea, even allowing for the distortion commented on above, whilst they are very slender, they are undoubtedly shorter than in the surrounding areas.

The myoid of the " rod " is very slender and it is not an easy matter to distinguish its structure amongst the outer myoids of the " cones." The sudden slimming of the " cone " distal to its oil-droplet allows the " rod " to swell just as suddenly before the myoid terminates in a short, thick, deeply staining ellipsoid. Just proximal to its termination the ellipsoid contains a small, seed-like body, highly refractile, and stained deeply with acid fuchsin and phloxine. The ellipsoid passes over into the sensitive distal extremity without any change in shape or volume. The latter structure does not stain and can be easily traced to the level of the nuclei of the pigment epithelium (Fig. 11). The rod myoids contain no oil-droplets and are arranged everywhere at a level distal to the oil-droplets of the cones. Because of the characteristic structure of the " rods," it is quite an easy matter to determine their absence from the centre of the fovea.

The pigment of the pigment epithelium, is dense everywhere, and takes the form of short, slender needles arranged in cylindrical masses which envelop the visual cells from the level of the inner edge of the nuclei of the pigment epithelium to the level of the oil droplets. It is the density of this layer which is probably responsible for the grey fundus reflex, as it would completely prevent any light from reaching the choroid.

The deep central fovea of the bird, as this example demonstrates, presents many remarkable differences from that of the deep central fovea of the lizard and the shallow, central one of man and the primates. In those diurnal lizards in which the eye is not too

small to allow of such a manoeuvre, all three nuclear layers of the retina are pushed away from the centre of the fovea so that no nuclear elements come into the path of these rays of light reaching the centre of the fovea. As a result of this, the cone fibres are elongated and there is a well-marked layer of Henle. In addition the outer segments of the foveal cones are greatly elongated, very slender and appear to lack oil-droplets. The elongation of the cones results in the inward curving of the external limitans, that is to say with its convexity towards the vitreous. The writer has seen this structure beautifully demonstrated in two Australian agamids—the bearded lizard (*Amphibolurus barbatus*) and the Gippsland water-dragon (*Physignathus lesuerii*). The more shallow fovea of man is constructed on the same principles—elongation and slimming of the visual cells to increase visual acuity without losing any sensitivity, and the removal of structures which might impede the light rays falling on the fovea. The bird has attained its high standard of visual acuity whilst neglecting to a large extent these two apparently essential factors. Kolmer[1] remarks that the retention of the oil-droplets in the fovea and the presence of a possibly more accurate accommodative apparatus renders the lengthening of the "cones" unnecessary. He quotes Rochon-Duvigneaud in support of his contention that the oil-droplets would tend to correct any aberration. The incomplete baring of the foveal area of the bird would seem to support the theory of Walls[3] that the function of the foveal depression is not to remove obstacles from the path of the light falling on it, but to scatter it over a wider area.

Acknowledgments.—This work was carried out in the Anatomy Department of the University of Melbourne under a Grant from the National Health and Medical Research Council of Australia. The writer wishes to thank Professor F. Wood Jones for his help and encouragement and Sir James Barrett for the gift of the Albatross. Through the courtesy of Sir Hugh Devine, Miss Sellenger was enabled to spend many patient hours on the drawings of the fundi. Finally he wishes to thank Mr. H. Marriott for his assistance in preparing the sections and photomicrographs.

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SPASM OF A BRANCH OF THE CENTRAL ARTERY

A Personal Experience

BY

HAROLD GRIMSDALE

LONDON

WHEN the Staff of the Royal Westminster Ophthalmic Hospital were called out of London, at the beginning of the war, the civil inhabitants were left with little skilled help; therefore I offered to work again in the out-patient department.

On November 10 I was walking down to the Hospital, when I noticed a positive scotoma in the right eye, of a reddish purple colour extending downwards from a little below fixation. The colour was not uniform in depth but there were patches which were less dense. In some ten minutes it disappeared. At the Hospital Mr. Martin Jones kindly looked at the fundus, but nothing abnormal was to be seen. I had thought at first, from the colour of the scotoma that it might indicate a retinal haemorrhage. There was no recurrence for about 10 days; but on November 21 in the morning a migrainous headache came on. I felt out of sorts and lay down; the scotoma reappeared in the same position. I thought it would pass off and slept for an hour, but finding on waking that it still persisted, telephoned to the Hospital and asked Mr. Martin Jones to come to see me.

He came and found a small vessel above and on the inner side of the yellow spot empty of blood from a point at which it made a sudden bend. There was a small haemorrhage in the retina above. The appearance of the vessel is represented diagrammatically in the annexed sketch made by Mr. Martin Jones.

He suggested that we should attempt to restore the blood flow and we went to the Hospital, where he gave an injection of 0·1 gram of acetylcholin at once. In a few minutes it was possible to see blood in that part of the vessel which had seemed empty; the scotoma remained. On the following day he gave another injection of the same amount, and advised me to take doryl tablets three times daily; the field of the right eye was taken and showed a loss corresponding closely to the position and size of the positive scotoma which had been the first symptom. There were some gaps in this loss also. Central vision, with + 1·50 D. sph., was 6/4 partly. 6/5 easily. I took doryl fairly regularly for about three weeks and less regularly for another three. The scotoma was little inconvenience; and soon lost colour and was unnoticeable. Mr. Martin Jones had the kindness to take the field and examine the fundus from time to time. The " windows " in the

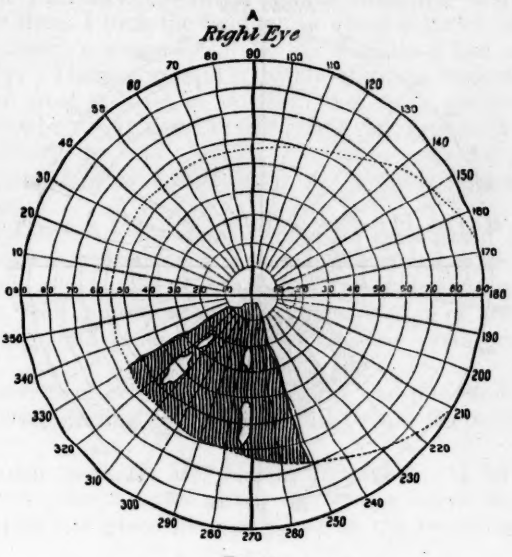


FIG. 1.

Appearance of positive scotoma (memory sketch).

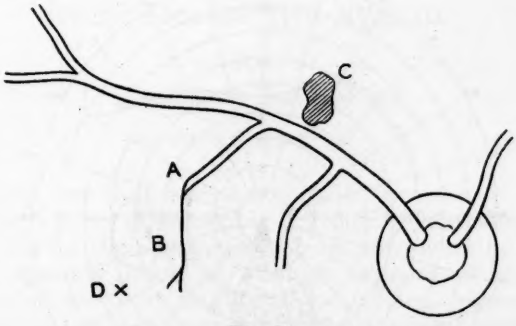


FIG. 2.

Sketch of appearance of vessels on November 21. A, bend in artery. B, empty portion. C, haemorrhage. D, position of macula.

field became slowly larger. He told me that vessels became visible running from a vessel on the inner side toward the vessel which had been apparently empty of blood but now was certainly pervious. It is probable that these are not new vessels but enlarged pre-existing vessels which were too small to be seen

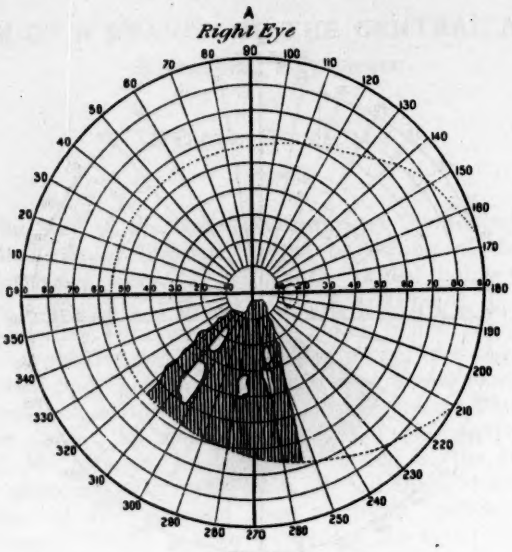


FIG. 3.

Field on November 22.

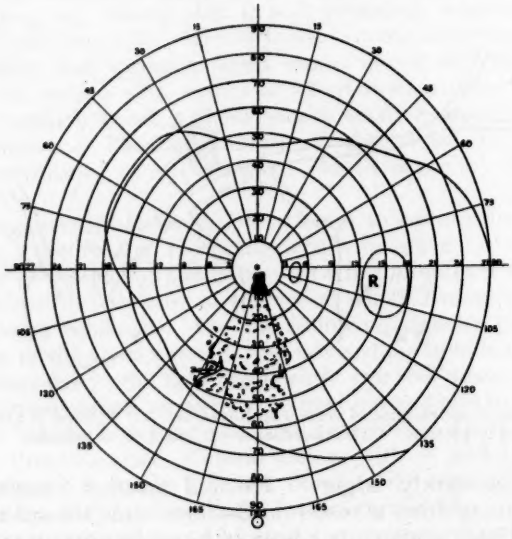


FIG. 4.

Final visual field.

before. On February 20—three months after the first onset—having free time, I took the field again using a 1 mm. object on a Priestley Smith's scotometer. To my surprise it had improved considerably. There was still a small absolute scotoma below fixation, but over the rest of the field the object could be seen almost everywhere. It was not quite clear but flashed in and out in some regions; no other definite scotomata could be mapped. This was confirmed at the Hospital on a metre screen with a 2 mm. object.

I had expected that the defect would be permanent, and this improvement was unforeseen. It seems probable that the " new " lateral vessels which Mr. Martin Jones saw, bringing the blood to the part, had prevented complete destruction of the retinal elements which had retained and had to some extent recovered power.

I have never seen or read of a case quite like this, and in view of its fortunate ending it seemed worth while to publish this record.

I have much to thank Mr. Martin Jones for. I have little doubt that his prompt action saved me from a much larger loss of field, and he has given me much help in the recording of the case.

MYCETOMA OF THE EYELID

BY

J. S. ALDRIDGE *and* R. KIRK

SUDAN MEDICAL SERVICE

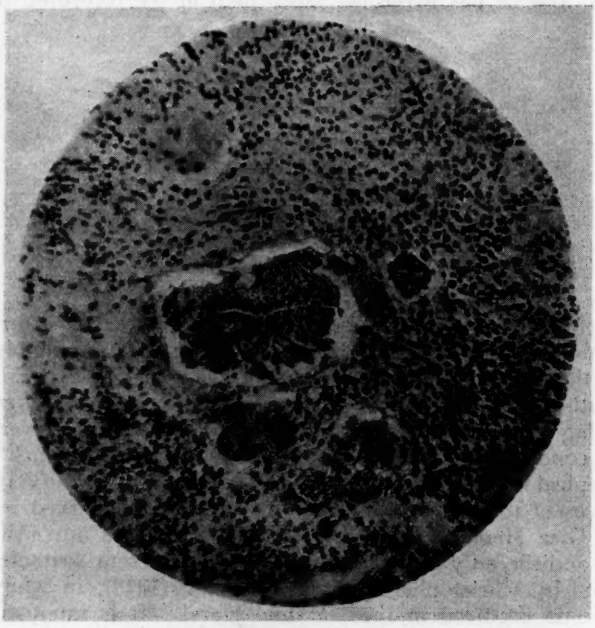
THE following case is of interest because of the extreme rarity of the condition. Elliot (1920) in his " Tropical Ophthalmology " states that during the many years of his experience in Madras he neither saw nor heard of a single instance of mycetoma occurring in the eye or its neighbourhood, adding, however, that as the condition has been described, it would be well worth while for tropical practitioners to be on the look out for any further instances of this rare condition. One case was observed in 1937 at the Giza Memorial Ophthalmic Laboratory in Cairo (Wilson, 1938), and the only other case known to the present writers is one reported by Christopherson and Archibald (1919), in which the granuloma occurred in the lacrymal gland. It is interesting to observe that this latter case came from approximately the same region of the Northern Sudan as the present one.

Case History

The patient, Saida Abdou, was a girl aged approximately four years, of Nubian race, from Sonki in the district of Halfa. She came to Wadi Halfa civil hospital complaining of a tumour of the left eyelid, of two months' duration. Examination revealed a tumour about the size of a marble, situated in the upper eyelid, at the outer angle, and passing up under the orbital ridge. It was more prominent on the skin surface than on the conjunctival surface. There was no tenderness; the overlying skin was normal and not attached to the growth. The tumour was removed through a skin incision and transferred to a ten per cent. formol saline solution for histological examination.

Pathological Histology

Paraffin sections of this tissue showed the morbid histological changes commonly associated with a fungus infection. The tissue was the seat of a chronic non-specific inflammatory lesion, characterised by hyaline fibrosis, plasma-cell and leucocytic infiltration,



Mycetoma of the Eyelid.—Section of the granuloma showing the fungal grains *in situ*. ×200

with occasional small imperfect giant-cell formations, and in the more densely infiltrated parts fungal grains could be seen irregularly distributed (see figure). Little in the way of detailed structure could be made out in the grains, and any attempt to culture them was obviously out of the question, but their appearance and relation to the associated histopathological changes are sufficiently typical to establish a diagnosis of mycetoma.

Acknowledgment.—We are indebted to the Director of the Sudan Medical Service for permission to publish this case.

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THE DEVELOPMENT OF OPHTHALMOLOGY IN BOMBAY

BY

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Introductory

THE origin and development of ophthalmology in the Bombay Presidency are closely bound with the establishment and growth of its medical institutions. No record, proving that ophthalmology was practised on scientific lines was available before these institutions came into existence. Even after the establishment of the Grant Medical College and the J. J. Hospital, it took some time for the teachers to evolve the different courses of instruction imparted in the institutions. Ophthalmology was considered as a minor branch of surgery and hence the course was limited to a couple of lectures delivered to the first batch of students of the College. It must, however, be said that the importance of this

special branch of medicine was never lost sight of even in the early part of medical education in this Presidency and with the steady growth of the College and the Hospital, ophthalmology found its place in the curriculum and became a separate science. Special facilities for the teaching and treatment of eye diseases were provided for, culminating in the end into a special hospital for the same purpose. It is, therefore, necessary to turn our attention to the origin and growth of these institutions in order to see how ophthalmology attained its present status.

Early History of Bombay Hospitals

" The first hospital in India appears to have been that at Goa, mentioned in ' Fryer's Travels.' First hospital in Madras was opened in about 1664; establishment of a hospital in Bombay was under discussion in 1670; but apparently it was not actually opened till 1676; the earliest hospital in Calcutta dates from 1707-08.

(1) The first suggestion of a hospital in Bombay seems to have been made in 1670.

In the Surat Diaries, 1669-75, is given a Commission of Instructions, dated Bombay, March 5, 1669-70 showing that it had been determined to build a hospital in the town.

' It was found that the natural disease of the country was infectious and endangering the life of the garrison and so the need of building a hospital arose, but it was decided to build it as frugally as possible and only those to be admitted who would bear their own expenses for the benefit they would derive from the hospital.'

Apparently the project of opening a hospital hung fire for several years. Two plans of the proposed hospitals were sent for approval to the President and Council at Surat on November 23, 1675. The plans were received, acknowledged and considered. Eventually on July 19, 1676, they were approved ' We like well of your proposition of making the present court of judicature an Hospital.' Six months later, a letter from Bombay to Surat, dated January 24, 1676-77, reports that the new hospital has been opened and has proved of much service.

During the siege of Bombay by the Siddhi in 1689-90, a hospital ship was in use. An entry dated March 15, 1688-89, in the Bombay Diaries, Vol. III, 1684-90, states :—

' Dr. Michill came ashore from the hospital ship with a list of killed and wounded.'

The use of hospital ship for the reception and treatment of the wounded in war is usually considered an important advance in the military medicine of our time.

A quarter of a century later another modern development,

female nursing in hospitals, seems to have been anticipated in Bombay. A Mrs. Pack had been sent out from England as matron for the Bombay Hospital, and had married soon after her arrival. She does not seem to have vacated her post on marriage. Her husband, Nicholas Hatch, was the Company's Master Carpenter.

A new hospital building was erected in 1733 near the marine yard, above the site of the modern Great Western Hotel.

As an outcome of disputes between two surgeons, John Neilson and Henry Compton, a standing committee was appointed. It consisted of the Marine and Land Paymasters and the Captain Commandant, to inspect the hospital monthly and report on it to the Council.

The Cons. of June 30, 1738, contain a report by the committee, and regulations for the hospital, also the existing staff and a proposed rearrangement thereof. Patients admitted were divided between the two surgeons, those admitted one week going to the first surgeon, those of the next week to the second surgeon. The pay of hospital assistants was fixed at six rupees, of outdoor assistants at eight rupees per month.

Another report by the standing committee of March 14, 1745-46, provided new regulations for the hospital, the chief of which were that the surgeons should visit the hospital twice daily at 8 a.m. and 4 p.m., that patients were to be divided equally between Mr. Neilson and Mr. Mathison; that each had to keep charge of his own cases throughout, and that they had to consult each other in serious cases.

'Grose's Voyage to the East Indies' contains a plan of Bombay, in which the hospital and doctor's house (No. 7 in the plan) are shown as a large building near the shore, on the west of the harbour.

The Cons. of October 15, 1755, contain a report by the Hospital Committee, on which orders were passed that 'A room for chirurgical operations' should be built.

Bombay letter of February 4, 1771, reports in para. 37 that another set of new regulations for the hospital was drawn up and in para. 38, the erection of a 'chemical laboratory' was ordered.

The Cons. of December 24, 1773, gives the following subordinate staff in the hospital under the surgeons: Messrs. March, Crozier, Fleeming and King, each Rs. 76 per month; Mr. Didrot, Rs. 40; Messrs. Jenkins, Mathews and Cabral, each Rs. 30.

Of these, the Hospital Committee found Messrs. King, Jenkins and Didrot an encumbrance because they could not be relied upon for compounding and dispensing of medicines and hence they were recommended to be removed.

Francis Crozier entered the Bombay service as Assistant Surgeon in August, 1773 and became Head Surgeon on February 10, 1784, and member of the Medical Board on September 15, 1789, only

sixteen years after the first appointment, an instance of very rapid promotion.

(2) In 1789 an old hospital, formerly used as a Hospital for men of the Royal Navy, was rebuilt on Old Woman's Island. A Bombay General Letter, dated February 21, 1769, reports in para. 19:—' Present hospital is too small, have appropriated one on Old Woman's Island used for the King's Service last war, and on February 11, 1768 we determined to fit it up in a commodious manner, but other buildings then carrying on, prevented our finishing it then, therefore on 7th instant determined to complete it agreeable to the estimate delivered in amounting to Rs. 9,234.'

(3) The Bombay Cons. of February 28, 1769, order estimates for building a shed to be used as a hospital for sepoys. This hospital had only a short life of some fifteen years. A General Letter from Bombay, dated December 31, 1783, states in paras. 25 and 26:—' The principal surgeon of the hospital having complained of an infringement of their contract by the Select Committee having abolished the Sepoy Hospitals, we issued orders countermanding that abolition, agreeably to the Surgeon's request.'

The Sepoy Hospital was, however, abolished by a G. O. of 1784. A Bombay General Letter of January 5, 1785, reports in paras. 27 and 30:—' The Sepoy Hospital in its late form abolished and the President's plan for establishing Battalion Hospitals adopted. The future mode of conducting the European Hospital will soon be considered.'

The Cons. of September 26, 1781, mentions that the plans of the new hospital, prepared by the Principal Engineer are to cost Rs. 5,15,025, and that the scheme must be postponed as too expensive.

Forbes, in ' Oriental Memoirs,' Vol. I, p. 152, states that when he left Bombay in 1784, there existed then three large hospitals; one within the Gates for Europeans, another on the Esplanade for the Sepoys and the third for convalescents on the adjacent island (Old Woman's Island). The first of these three was the General Hospital of the day, the second and the third were opened in 1769.

A letter from the Bombay Medical Board to the Council dated August 24, 1787 complains that only two surgeons are allowed to attend the sick of these three hospitals, which are all at some distance from each other, two of them being outside the gates; that two men cannot cope with the work, in addition to all their other duties; and that hitherto four have been allowed! They further state that the number of sick in the garrison much exceeds that at Fort St. George and is almost, if not quite equal to that at Calcutta; and that on the morning of the day they write there were 325 in-patients of whom 221 were Europeans in the three hospitals.

A Bombay Military Letter of March 25, 1801 reports in para. 60 that the hospital within the Fort has been completed.

In 1824, new buildings were erected for the hospital on the Hornby Road. It took in the sick both of the garrison and the civil population. In 1861 the institution was moved to temporary quarters in the grounds of the Artillery Barracks in Fort George, and in 1876 to a building called the Officers' Quarters. The foundation stone of the present St. George's Hospital was laid on February 22, 1889, on the site of the old Fort George and the buildings were completed in 1892, at the estimated cost of Rs. 5,69,667, which was little higher than that of 1781.

Some sort of native hospital was in use in 1809 and treated about twenty patients daily. It was supported by Government. The Bombay Native Dispensary was opened in 1834 and the Girgaum Dispensary in 1846."

Just as the St. George's Hospital owes its origin to the first hospital built in 1670, so also the present J. J. Hospital owes its origin to the Native Hospital in existence somewhere about 1809.

The First Ophthalmic Institute.—It is not known whether any provision for the treatment of eye diseases was made in all these three hospitals, from their inception in 1670 and 1769. The first provision for the treatment of eye diseases is contained in a Bombay General Order of March 10, 1823, sanctioning the establishment of an ophthalmic institution in the city, and appointing Assistant Surgeon Richmond of His Majesty's 4th Dragoons, as Superintendent. This institution was absorbed in the J. J. Hospital in 1845.

Grant Medical College.—It was in the year 1826 that the first medical school was established in Bombay. This was the second school in the whole of the country. The first was established in Calcutta in 1822 and the third in Madras in 1827. The school in Bombay functioned for six years only and was abolished in 1832. The second attempt made to establish an institution for imparting a higher type of medical education, proved successful, owing entirely to the genius and wise statesmanship of Sir Robert Grant, who became the Governor of Bombay in 1835. Soon after assumption of office, he devoted his attention to establishing a native medical school in the Presidency. The failure of the first school, however, made him cautious. As a first step in this direction, he founded the Medical and Physical Society of Bombay, to which the medical officers of the public services belonged. This Society is flourishing to-day as the Grant College Medical Society and probably it is the oldest medical society in India.

After this society was well organised, Government asked its Managing Committee to submit its matured opinion on the expediency of instituting a more complete and comprehensive system of medical education. At the same time, Government

asked the opinion of the various medical officers of experience and other functionaries in several districts in the Presidency, regarding the conditions of medical practice that prevailed, and whether there existed any obstacles to the introduction of a better system.

After great deliberations regarding difficulties and prejudices that might crop up against the proposed institution, when he received a favourable report from the Committee of the Medical Society, Sir Robert Grant drew up a most able minute, in which the subject of the medical education of the natives of this Presidency was fully discussed and plans of instruction proposed, which form the groundwork of the system to be followed in the school which has been honoured with the name of this distinguished statesman. This was transmitted to Calcutta about the middle of the year 1838. It was approved by Lord Auckland's Government, but before this intelligence had reached Bombay, Sir Robert Grant died (July 9, 1838). The Hon'ble Court of Directors sanctioned the plan of a medical school as proposed by Sir Robert Grant, and authorized its being designated " The Grant Medical College."

The fund subscribed amounted to Rs. 44,800. The Hon'ble Court of Directors contributed an equal amount to defray the cost of the college building (total Rs. 89,906-4-2). The foundation stone of the college was laid on March 30, 1843 by the Lord Bishop of Calcutta. It was completed in October, 1845 and was made over to the first Principal of the College, Dr. Charles Morehead.

J. J. Hospital.—Early in 1838, Sir Jamsetjee Jeejeebhoy offered to pay into the Government Treasury the sum of rupees one lakh, provided the Government contributed an equal amount. The income from this was to be spent on a hospital established for the relief of the " poor sick " of all denominations. It was finally decided to build the Hospital in the close proximity of the Medical College, to designate it the Sir Jamsetjee Jeejeebhoy Hospital, to construct it for the accommodation of 300 sick, just regard being paid to prejudices of caste, to close the Native General Hospital on the opening of the new institution, to constitute the Professors of the Medical College the medical officers of the Hospital and to place it under the control of the Superintending Surgeon and the Medical Board, subject to the scrutiny of an Honorary Board of three Managers of whom Sir Jamsetjee Jeejeebhoy or his representative was to be one, the other two being nominated by Government.

The foundation stone of the Hospital building was laid on January 3, 1843 with Masonic honours by the R.W. the Provincial Grand Master of Western India, Dr. James Burns, K.H.

It was opened for the reception of " the sick " in the month of May, 1845, when the Native General Hospital was closed, and its inmates transferred to the new building.

The Grant Medical College and the Sir J. J. Hospital started on their career simultaneously in the year 1845. October 20, 1845, was fixed for the examination of candidates for admission into the College, and on November 1, 1845, instructions began with 12 students on the rolls.

The subjects of study in the first year were anatomy and chemistry, the former being taught by Dr. John Peet and the latter by Dr. H. Giraud. In the second year the subjects of materia medica and institutes of medicine were further added and were taught by Dr. Charles Morehead.

The beginning of Ophthalmology.—The subject of anatomy was taught by the Professor of Anatomy and Surgery, Dr. Peet. The syllabus of anatomy included five lectures on the organs of special senses of which two were devoted to the study of anatomy of eye and its appendages, which was a well-nigh comprehensive and detailed study of the organ of vision.

In the second Annual Report (1846-47) of the Grant Medical College the following reference is obtained under the heading "Anatomical Museum":—

"Thirty-two admirably executed diagrams of the anatomy and diseases of the eye have with the sanction of the Medical Board been transferred from the oculist's department to the museum of the College, and these will prove very useful indeed to the students at a more advanced period of their studies."

This reference lends support to the assumption that there existed an oculist who was interested in diseases of the eye and was engaged in preparing material to be made available at a future date for instruction in diseases of the eye. Who the oculist was is not clear from the Report. Probably he belonged to the Ophthalmic Institution first started in 1823.

Lectures and clinical instructions in surgery began in the third year (1847-48). The Professor of Surgery gave lectures on diseases and injuries of the eye and lacrymal apparatus. In the year 1849-50, 29 cases of ophthalmia were treated in the J. J. Hospital and three operations were performed for entropion.

In the same year under report, 107 cases suffering from acute diseases of the eye and 29 chronic cases attended the dispensary of the J. J. Hospital. All communities were represented in these diseases. Three cases happened to be of syphilitic iritis.

The doubt as to who the oculist was is cleared up by reading the Annual Report of the Grant Medical College for the fifth year (1850-51) in which it is laid down that "the fifth year students have all, in rotation of periods of three months, attended the eye dispensary, and have derived much advantage from the experience and able instruction of the oculist, Mr. R. D. Peele. This latter gentleman had voluntarily offered his services to teach midwifery at the commencement of the fourth year of the College along with

Dr. W. C. Coles, M.D., who similarly volunteered to teach medical jurisprudence. It is evident from the fifth Session Report that Mr. Peele was continuing as the oculist and looking after the eye dispensary or department in the J. J. Hospital while the lectures in ophthalmology were delivered by the Professor of Surgery.

In the year 1850-51, the first case of cataract was operated upon in the J. J. Hospital and discharged.

The final examination for the diploma of graduate was held in the year 1851, by the Government Examiner, wherein ophthalmology was included in the subject of surgery. Although no question or questions were set in the written examination, candidates were examined orally and questions were asked on varieties of ophthalmia, iritis, cataract and short sight. The operations asked for cataract, were extraction and depression. It appears from this that couching for cataract still created interest and was probably considered to be a rational mode of treatment of this condition, although it was replaced by extraction nearly a century before by surgeons on the Continent (Daviel, 1745). Couching is essentially an Indian operation, its pioneer being Sushruta of the Ayurvedic fame, and it is no wonder that this operation still created interest and held a place in the surgery of cataract in those days.

The Ophthalmic Dispensary.—The Annual Report of 1850-51 states that a building for the accommodation of the eye dispensary and the department of vaccination has just been completed in the compound of the college, so that the students would enjoy ample opportunity of making themselves acquainted with the diseases of the eye, and the course of the vaccine disease. The plan of the eye dispensary is given in the annual report of the Grant Medical College of 1852-53.

This dispensary was built over the same situation where the present hospital stands to-day. This building consisted of a small block of nine rooms, of which the first three contained the eye dispensary. The next three were occupied by the vaccination office and the last three were used as dispensary for women and children. The eye dispensary was without any beds, its patients being admitted into the J. J. Hospital for treatment. This tiny little structure may therefore be regarded as the first visible sign of scientific ophthalmology in the J. J. Hospital Compound. The present magnificent structure can be rightly said to have developed from this small nucleus.

The year 1851 was an epoch-making year in the history of medical education of this Presidency. It was in this year that the final examination for the Diploma was held after the establishment of the college in the year 1845 and the first batch of medical graduates left the institution.

The " Final Examination " was conducted by Dr. M'Lennan, Government Examiner, Mr. Stovell, Mr. Watkins, and Dr. Campbell, Government Assessors, and the following candidates were found qualified for the diploma of Graduate:—Sabastian Carvalho, Anunta Chandroba, J. C. Lisboa, Bhawoo Dajee, Atmaram Pandurang, Paul C. Gomes, Merwanji Sorabji, Burjorjee Dorabjee.

On the day of the presentation of diplomas to the graduates on Tuesday, April 15, 1851, on which many higher Government officials and distinguished visitors were present, Dr. Charles Morehead, the principal, opening the proceedings, referred to this day in the following terms:—

" This day is a great epoch in the history of the Grant Medical College. It commemorates the fulfilment of the statesman-like views which led to its origin, and silences we may hope for ever, the desponding forebodings which have more or less attended its progress. It is this day on which the first fruits of the college are to be presented to the people of Western India, in the eight young graduates who are now to receive from your hands the justly-earned title of ability to practise the arts of medicine and surgery."

Addressing the graduates he said:—

" You are the first approved and accredited agents in a great work of national amelioration; you are to go forth armed with great powers of conferring inestimable benefit on others, not only mitigating their physical suffering and soothing their mental anxieties but also in enlightening and elevating their minds. Should you fail in this great mission, should the expectation of the great and good man whose generous advocacy of the interests of the people of this country has thrown open to you the portals of science and been the means of placing you in the proud position which you are about to fill—should these expectations be doomed to disappointment, where will the blame lay? I must not conceal from you that it will be with yourselves."

Speaking about the graduates themselves, the Government Examiner—the Physician General, in his letter to the Secretary to Government, General Department, dated April 18, 1850, wrote as follows:—

" Having at one time my thoughts much directed towards the medical education of natives, I had never entertained a doubt that they were as capable of acquiring the preliminary information necessary for the foundation of the medical education as any man whatsoever; but I had entertained doubts as to their reasoning powers; and as to their correct and useful application of that preliminary knowledge to the recognition, discrimination and treatment of various forms and shades of disease not differing in name, though differing in other matters of far greater import than name.

" The result of these examinations has gone far to removing my doubts on this subject; and as far as examination can test fitness for engagement in medical and surgical practice, the graduates of the Grant Medical College have proved their fitness to as great a degree as I believe is ever done in Europe."

The genius of Sir Robert Grant had thus triumphed. These eight young graduates were not only born out of the genius of Sir Robert Grant but they were the product of the indefatigable industry of Dr. Charles Morehead and his colleagues, who had tended and fostered this institution in its young days.

The effect of this was far reaching upon the public of this Presidency. These graduates were the pioneers—the torch-bearers, who kindled the flame of medical science in Western India which to this day has been kept alive by the hundreds who have flocked to this institution in the years following. With the steady growth of science, separate institutes for every branch of medicine slowly came into existence. Ophthalmology slowly began to assert itself and it no longer remained a neglected branch of medicine.

The question of increasing the number of Professorships in the College was brought to the forefront in the year 1854-55, with a view to bringing the College under the regulations of the examining bodies of Great Britain. Sanction was obtained from the Honorable the Court of Directors and Chairs of anatomy and surgery and that of chemistry and materia medica were separated and a new Chair of ophthalmology was established. The first gentleman to adorn this Chair (of ophthalmology) was Mr. H. J. Carter, M.R.C.S. who was appointed the acting Professor of Ophthalmology, Mr. Peele having resigned. This separation led to increase in the number of lectures in these subjects and to a more extended course of instruction in botany, practical toxicology and ophthalmic surgery.

A comprehensive course of lectures on eye diseases was drawn up and in the same year Mr. Carter submitted his report as follows:—

" The course of ophthalmic surgery consisted of 26 lectures (as against three only in the former years delivered by the Professor of Surgery and included in his subject), 20 examinations, during which the anatomy of the eye and its appendages was minutely described, and its physiology, so far as this relates to the understanding and treatment of ophthalmic affections.

" Inflammation specially, and then generally, as regards the entire organ, was fully considered, and its treatment. The inflammatory affections of the superficial structures, and of the deep seated or internal structure, were severally described and accompanied by their treatment respectively. The morbid affections of the lids, and the malignant disease of the eye, were described,

with their treatment, and successively those of the retina and optic media. Lastly, the diseases of the lacrymal apparatus, and their treatment, was described.

" All the operations which are chiefly performed for remodifying morbid alterations in the lids, and external parts of the eye, as well as those which are performed on iris and lens, for the restoration of sight, were detailed, and the course generally illustrated by diagrams, so far as the resources of the College should permit."

Whereas the whole subject of ophthalmology was briefly considered in three lectures in the course of surgery, the subject as dealt with now in greater detail and as many as 26 lectures were required to cover the whole subject—a fact which easily proves the comprehensive manner in which ophthalmology was taught from this year onwards.

A wider interest in the subject of ophthalmology was being taken by the Graduates of the College. A Medical Society was in existence under the name of Grant College Medical Society. This society was really the continuation of the Medical and Physical Society originally started by Sir Robert Grant. The body met often and its deliberations were presided over by the Professors of the College, who ably guided its proceedings. Papers were read on widely different subjects and discussed by the graduates and professors of the College with a view to stimulate research and better understanding of the more difficult problems involved in the practice of medicine and surgery. Even ophthalmic problems received attention of its members, as can be seen from the proceedings of this society in the year 1854-55, when Mr. Lisboa described a successful operation for cataract in which the lens was absent, and the opaque capsule was attached to the iris by a pedicle.

In the year 1854-55, an important step in the advancement of native medical education was effected, in the recognition of the college by the Royal College of Surgeons of England as one of its affiliated schools for medical instruction. In the year 1855-56, a similar recognition was granted by the University of London. With a view to taking advantage of this recognition, one of the graduates, Mr. Rustomjee Byramjee, proceeded to England in June, 1855 to obtain higher qualification.

It is very significant to remark that this same graduate received the diploma of the Royal College of Surgeons of London, obtained the degree of Doctorate of Medicine from the University of St. Andrews and successfully competed for the appointment of Assistant Surgeon in the Indian Service in the year 1856-57. He had thus the honour of being the first Indian to have crossed the seas to obtain a higher qualification in England, and he did so very creditably indeed.

The Bombay University was established in the year 1857. In the year 1860-61 a new change came upon the College. The examination for admission into the College was abolished and the Matriculation Examination of the University was substituted for it. Moreover, the power of granting diplomas which was possessed by the college, was ultimately withdrawn and the examination for licence of practice, or for a degree, was held by the University. The College was thus affiliated to the University.

From here onwards we have no records available to show the progress of ophthalmology. But a very significant change took place within a couple of years. It is not necessary to dwell here upon the deep impression the college and its allied institutions had made upon the public. Scientific medicine had firmly established its reputation in Western India and had once and for all set at rest the fears of the orthodox mind. The usefulness of these institutions had been proved beyond doubt. No pains were spared to maintain the standard of instructions at a higher level. Many public-spirited gentlemen had offered prizes and scholarships by way of encouragement to the students. Even the long-felt want of a lying-in hospital was supplied by the munificent donation of Sir Jamshedjee Jeejeebhoy, to which large sums were contributed by many generous individuals. This obstetric institution came into existence in 1853. The modest little dispensary for the treatment of eye diseases was doing its useful work. But it had no beds. Its patients had to be admitted to the J. J. Hospital for treatment. It needed a building of its own and without one its services could not be established on a more organised basis. It had proved its usefulness beyond doubt. The public were deriving great benefit from the efficient treatment administered to the patients attending it. It was therefore sorely in need of a building of its own wherein it could treat both the out-patients and in-patients as well. The silent appeal that this ophthalmic dispensary made to the general public did not fail to evoke sympathy in the hearts of its generous admirers. Early in the year 1863 a philanthropic donor came to its rescue.

The Sir C. J. Ophthalmic Hospital, Bombay

In the year 1863, the first Baronet, the then Mr. Cowasji Jehangir, made a munificent offer of Rs. 50,000 to the Governor in Council, towards the construction of an eye hospital on the premises of the Grant Medical College. Government accepted the offer with thanks and the India Office in their letter of June 25, 1863, wrote in reply to His Excellency the Governor in Council, Bombay, as under:—

> "I do not doubt that the construction of a building especially adapted for the treatment of diseases of the eye

will be found highly beneficial and I have to request that Mr. Cowasji Jehangir may be informed of the high sense I entertain of his liberality in contributing so largely towards the provision of such a building."

The total cost of erecting the building, however, came to Rs. 97,143, and although Sir Cowasji's offer was of Rs. 50,000, he was so generous that he defrayed the total cost of constructing the hospital which bears his name. After the completion of the building the Governor General in Council sent their acknowledgment to the " philanthropic donor," and Sir Charles Wood, the then Secretary of State, wrote from London to express the sincere thanks of Her Majesty's Government to Mr. Cowasji Jehangir. Thereafter the Government of Bombay congratulated Mr. Cowasji Jehangir by passing a resolution in Council as follows:—

" His Excellency the Governor in Council congratulates Mr. Cowasji Jehangir on the completion of this building, which will prove a lasting memorial of his philanthropy."

The Sir Cowasji Jehangir Ophthalmic Hospital thus came into existence for the first time on July 21, 1866, twenty-one years after the inauguration of the Grant Medical College, and the Sir Jamshedji Jeejeebhoy Hospital. It is situated at the South-West corner of the J. J. Hospital Compound and forms one of the group of hospitals situated in this compound affiliated to the Grant Medical College for teaching purposes.

The hospital then provided an out-patient department and indoor accommodation of 40 beds. It contained six large rooms and several small rooms; of the large ones, three were used as male wards of 28 beds and one as a female ward of 12 beds. The fifth and sixth rooms were used as waiting and prescribing rooms. This was the first organized attempt to treat diseases of the eye separately, the need for which was long felt, even in those days, and as years rolled on, the necessity and utility for such an institution began to increase and the need for its further extension arose; as the hospital was found to be too small for the needs of a large city like Bombay and admission was almost entirely restricted to patients requiring the more important and delicate operations, chiefly cataract extraction and glaucoma operations, while cases with ulcers and such other diseases had to be refused admission. The hospital served also for practical instruction to the students of the Grant Medical College, and as long as their number was limited, this was carried on satisfactorily, but year after year the number of students kept on increasing, this being the only medical college in the whole of the Presidency. Consequently teaching had greatly suffered through want of accommodation and adequate facilities for this purpose. Also, as the demand for beds in the hospital was increasingly felt, matters were again represented by Col. H. Herbert, I.M.S., the then ophthalmic

surgeon, to Sir Jehangir Cowasji Jehangir, the Second Baronet, in the year 1906, *i.e.*, forty years later, and the Baronet readily offered to place at the disposal of the Government a sum of Rs. 25,000 towards the cost of constructing a new building on the following conditions:—

> "That the old and new buildings be named 'The Sir Cowasji Jehangir Ophthalmic Hospital.'
>
> That a medallion bust of the late Sir Cowasji Jehangir be placed in a conspicuous place to be selected in consultation with the donor, accompanied by a tablet reciting the name of the hospital.
>
> That a special ward to contain at least eight beds be reserved for Parsi patients, a tablet being affixed at the entrance of the ward inscribed 'The Sir Cowasji Jehangir Ward for Parsis only.''

As the building was estimated to cost Rs. 58,290, Sir Jehangir generously increased his contribution to Rs. 30,000, to enable the Government to commence work without delay.

His Excellency the Governor in Council was pleased to accept with gratitude the offer made by Sir Jehangir. The Governor in Council desired to take that opportunity of giving public expression to his appreciation of the liberality of Sir Jehangir Cowasji Jehangir, which enabled provision to be made for the much needed addition to the existing accommodation in the ophthalmic hospital.

Accordingly, His Excellency the Rt. Hon'ble Lord Lamington, G.C.M.C., G.C.I.E., Governor of Bombay, laid the foundation stone of the Sir Cowasji Jehangir Ophthalmic Hospital Extension on September 25, 1906. It was completed in December, 1908. The cost of this amounted to Rs. 71,175, of which the sum of Rs. 30,000 was contributed by Sir Cowasji Jehangir.

This extension provided an out-patient department, major operation room, 14 additional beds, a nurses' room, and the surgeon's room. The out-patient department included waiting room, general out-patients' room, minor operation room, dark room, dispensary, pathological room, and refraction room. The indoor accommodation was thus increased to 73 beds. In this way the new block allowed considerable expansion of out-patients' work, afforded ample facility for teaching purposes and provided a few more beds for the admission of patients other than those requiring operative treatment.

The life of the hospital was thus put on a firmer basis and the work continued onwards with unstinted zeal. Meanwhile the science of ophthalmology was growing and newer methods and scientific appliances for diagnosis and treatment of eye diseases were coming into vogue every day. The mental outlook of the

public was changing as days passed by. Men were crowding the hospital in larger numbers, as they began to realize the value of accurate diagnosis and scientific methods of treatment available in this institution which could boast of being the one and only hospital of its kind in the whole of the Presidency, to say nothing of the smaller hospitals and dispensaries that sprung up later on. One fact alone suffices to prove the force of this argument. Whereas in the year 1872 the total number of cases treated and operations performed was 5,169 and 448 respectively, in the year 1927 it was 14,588 and 4,200. Above all, the appalling blindness in the country in general and the Presidency in particular was very keenly felt. For the treatment of preventable blindness it is necessary to provide for a separate septic ward. Owing to the limited accommodation of 73 beds it was not possible to admit these cases. The havoc played by ophthalmia of the new born and venereal ophthalmia, to say nothing of that highly contagious and infectious disease trachoma, which is blinding the population of this Presidency in larger numbers, in augmenting the number of the totally blind, has yet to be fully realized. But as long as provision was not available for such cases, nothing could be done. The need for extension of the indoor accommodation was all the more felt in view of the fact that post-graduate teaching had increased in the institution and up-to-date provision had to be made for maintaining the high standard of teaching. A large number of students of this institution used to go abroad for higher qualifications in ophthalmology. The success that these students achieved in England in obtaining D.O. and D.O.M.S. diplomas within a short space of a few months of their completion of post-graduate work at this institution, stimulated Sir Jamshedji Duggan to obtain further means to raise the standard of teaching by increasing the available resources for this purpose. Further, the University of Bombay was then considering the question of instituting the diploma in ophthalmology. Moreover, the indoor accommodation needed a radical change in its outlook. The old wards offered a clumsy contrast to the 1906 extension. They were ill ventilated, dark and dismal looking and were situated on the ground floor only. The necessity to rebuild them on the most modern and up-to-date principles of hygiene and sanitation was very keenly felt as our ideas about the treatment of eye diseases were rapidly changing with the advancement of science. With these considerations weighing in his mind, Sir Jamshedji appealed to Sir Cowasji Jehangir (Second Baronet) to rebuild the hospital with increased accommodation, the urgent necessity of which was being felt every day.

Sir Cowasji Jehangir was so greatly impressed that he readily responded to this appeal for the rebuilding of the hospital with which the name of his family has been so long and worthily

associated. He generously offered to give a munificent donation of rupees one lakh and a half for utilizing it in the best way possible in furtherance of the proposal to rebuild the ophthalmic hospital. Sir Cowasji Jehangir (Second Baronet) thus came for the second time to the assistance of this institution founded by his late father.

Sir Leslie Wilson, the then Governor of Bombay, had inaugurated a fund for the extension and improvement of the existing hospitals and building up newer ones for the special needs of the people of this Presidency—called then " The Sir Leslie Wilson Hospital Fund." After Sir Cowasji Jehangir had made his princely offer of a lakh and fifty thousand rupees for rebuilding and increasing accomodation in the hospital, an equal amount was added from the above fund and the new building of four storeys was erected on the present site at a total cost of Rs. 3,03,983-15-4.

The foundation stone of this new building was laid by His Excellency Sir Leslie Wilson, the then Governor of Bombay, on November 20, 1928, and after the completion of the new hospital building it was taken into use from October, 1930.

The hospital has now an accommodation of 100 beds. It has a separate ulcer ward for the treatment of infectious diseases, and a special operation theatre for septic and minor operations has also been added. The hospital is equipped with the best and most modern appliances for the diagnosis and treatment of eye diseases. The out-patient department is large and is able to meet the demands of about three to four hundred patients daily. The building is four storeyed and possesses a simple yet magnificent structure and occupies the most enviable corner of the J. J. Hospital compound.

The fame and status of this hospital are no longer local. This " Urbs prima in Indis," can justly be proud of possessing an ophthalmic hospital which has acquired an international reputation. Among the visitors attracted to this hospital from overseas were some of the most eminent ophthalmic surgeons, who were very much impressed with the high standard maintained in the treatment of cases as well as in the instruction imparted. To many of these distinguished visitors the high standard maintained in every department of this hospital came as a sort of revelation. This hospital can compare most favourably with any of the first-class ophthalmic hospitals of the world, and there is no dearth of any clinical material.

To Sir Cowasji Jehangir Readymoney the public of Bombay owe a deep debt of gratitude for the munificent donations his family has freely contributed from time to time in bringing this hospital into existence and making it the most modern and up-to-date institution in the whole of the Presidency. It is the life work of a family that was mainly responsible for this princely charity

and this hospital will stand as an everlasting memorial of their philanthropy. It is a child born out of charity and entirely devoted to charity.

The following are the names of the ophthalmic surgeons in charge of the Sir Cowasji Jehangir Ophthalmic Hospital, Bombay, since the year it came into existence, namely 1866:—

1866 to July, 1867.—Surgeon-General Sir William Guyer Hunter, M.D., F.R.C.S.E.

July, 1867 to January, 1872.—Major J. H. Sylvester, M.R.C.S., F.G.C.

January 28, 1872 to May 31, 1895.—Brigade Surgeon Lt.-Col. George Archibald Maconachie, M.D., C.M. (Aber.).

June 1, 1895 to April 19, 1907.—Lt.-Col. H. Herbert, I.M.S.

April 20, 1907 to February 28, 1914.—Lt.-Col. P. P. Kilkelly, M.B., I.M.S.

March 1, 1914 to December 31, 1922.—Lt.-Col. G. McPherson, M.A., M.B., C.M., F.R.C.S.E., I.M.S., C.I.E.

January 1, 1922 onwards.—Lt.-Col. Sir J. N. Duggan, Kt., C.I.E., O.B.E., D.O. (Oxon), F.C.P.S., L.M. & S.

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MICROPHTHALMIA AND THE VISUAL PATHWAYS

A Case Associated with Blindness and Imbecility, and Sex-linked

BY

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IN this investigation the chief points—beyond the history and observations of the patient during life—are the gross and microscopical features of the eyeballs; then of the visual pathways, traced along the optic nerves, chiasma and tracts to the lower visual centres in the midbrain; finally the brain as a whole, and the cortical visual areas in particular, were examined.

(The remarkable and possibly unique feature of this eye condition being a recessive sex-linked one has already been the subject of a paper by Dr. Fraser Roberts (1937), the genealogy showing 14 cases, all males, traced in four generations.)

The bulk of the literature on microphthalmia is generally concerned with clinical observations on the living, or examination of the eyeballs after death; and considerations of any effects of such malformation on the visual pathways to the brain and in its visual cortical areas seem rare. Hence this investigation, which is particularly directed towards the latter, may be worthy of record.

We would preface, however, with the note that since the eyeballs in the present case were found completely disorganised, undeveloped, and obviously incapable of receiving or transforming light, the cerebral effects may be expected comparable to those of *anophthalmia* (congenital or experimentally produced), where they have been studied and to a vast extent, though with confusing and contradictory results.

Without a tedious and inconclusive analysis of detail, such records seem to come into two broad groups. Namely, the one where the visual cortex is found structurally altered, and the other where it is found to be little, if at all, affected. In both groups there have been described decided changes from the normal in the lower visual centres (the lateral geniculate and superior quadrigeminal bodies) as well as in the optic nerves, chiasma and tracts. And generally it may be said that the visual cortex appears to be less affected by experiments on lower animals, than is found by clinical observations upon man.

Of the former group of records of alteration in the cortex, Leonowa (1893, 1896) especially found the lamina granulosa absent, and he considers that this cell layer and the stria of Gennari are only developed when the cortical visual area is functionally active. Some support to this is given by Hanke; by Bolton and Campbell, who found marked reduction in thickness of the stria in cases of old-standing total blindness; and by Monakow, who found the visual system atrophied all the way through in a congenitally blind man 75 years old. Hippel (1909) (in Schwalbe's monograph of bodily malformations in general), states that in anophthalmus congenitus, there frequently occurs an absence of the optic nerves, chiasma and tracts, a reduction of the pulvinar, with changes in the cellular structure of the visual cortex.

On the other hand, Woollard (1926) in a case of anophthalmus congenitus in a new-born puppy found no alteration in the cellular lamination of the visual cortex; nor did Monakow and Michel, after experiments on various animals. Tsang (1937) gives a good review of the literature concerning both clinical and experimental observations (the above undated citations are taken from his paper and from that by Woollard). Tsang experimented on rats; and after enucleation of the eyeballs at birth examined the effects at three subsequent stages of growth, and found the

time factor was decisive in inducing degeneration of the visual centres; the superior quadrigeminal bodies were most affected, next the lateral geniculate bodies, and least of all the cortical visual areas. He suggests that this gradation of effects is due to the different functional intimacy of the retinal fibres with these visual centres. He also remarks, as possibly explaining the variant results of experiments, that there were different methods used and upon quite different animals, in which the visual system plays very different roles in life.

The present case of what must have been complete blindness from birth to death at 17 years, presented a combination of features differing from those noted above. There were completely malformed and functionless eyeballs; ribbon-like optic nerves; a small chiasma and thread-like tracts; also a reduction in size of the lateral geniculate bodies, with defective lamination. But the superior quadrigeminal bodies were normal in size and structure, the optic radiation was well formed, and the visual cortex, though reduced in surface area, showed a well-marked stria of Gennari and lamina granulosa, with little cortical cellular alteration elsewhere. These conditions were found in both hemispheres, though, as will be described, the right occipital lobe was malformed.

The case comes under van Duyse's (1899) third group of microphthalmia — those without coloboma but associated with other abnormalities; and Ida Mann's (1936, 1937) third classification of eye-defects—an arrest of development plus a superimposed aberrance. The cause most likely is an inherent fault in the germ plasm. It may be added that the eyeballs may be small but otherwise normal (Parsons, 1904). Also that several writers have observed that microphthalmia can be associated with mental impairment.

The particulars of our case now follow.

History.—The patient (serial number D.115, in the records) was admitted to Stoke Park Colony, Bristol, on October 11, 1935, and died on September 9, 1937. He was a congenitally blind imbecile of a chronological age of 17 years and 4 months at death. He was the third of four male children; the youngest is also blind and mentally defective, but the parents and two elder boys are normal in all ways.

Examination.—He could hear, had a limited vocabulary but no conversation; knew the names of common objects, could distinguish and count his fingers, but was dull, stupid and vacant. He had unsteady gait, was excitable, and restlessly rocked his body; he required care, supervision and control, but was of clean habits. Height 5 feet 2½ inches, weight 6 st. 2½ lbs.; emaciated;

his skeletal and bodily abnormalities were general physical undevelopment, with a narrow subcostal trunk, genu valgum, and short terminal phalanges of the thumbs.

His years of retardation from the normal were:—in head size (1283 c.c.) five years; stature standing and sitting, each a year late; weight two years below average for age. The Binet intelligence tests indicated a mental age of four years, giving an I.Q. of 29. But owing to the blindness this figure is only a rough estimate. He walked and started talking at approximately two years of age.

He died of acute broncho-pneumonia. The post-mortem examination showed the skull to be of normal thickness, but with inequality of the two halves, the right being smaller, especially in the occipital region; there were no other points of particular interest.

The eyes, in life, were examined by Mr. Iles, of Bristol, whose report states that both were sunken in the sockets; intra-ocular tension minus; no nystagmus. The cornea of the right eye

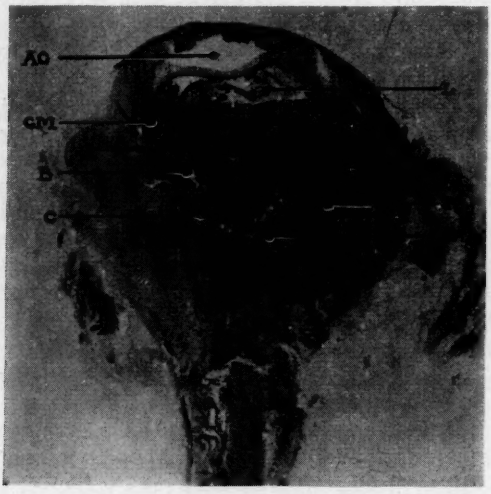

FIG. 1.

Micro-section through right eye of D.115. Note enormously thickened cornea and sclera; partial obliteration of anterior chamber (A.C. with iris behind); lens rudimentary (L); retina quite undifferentiated, but producing a mass of neuroglial and pigment epithelial proliferation (R.) filling the entire vitreous chamber, with bone formation behind it (B.). The ciliary muscle and process are seen (C.M.); also the thickened choroid (C.). The optic nerve is thickened here, just behind the globe, by neuroglia and dural sheath, but became ribbon-like towards the chiasma. ×3.

showed dense leucoma adherens and ground-glass opacity over a sector of about 60°; no vascularity; anterior chamber shallow, pupil drawn up and very small; lens not seen. The cornea of the left eye was opaque all over, with vessels spreading from the ciliary zone; iris adherent to cornea.

After death and preservation in formalin solution the eye-balls had transverse and antero-posterior dimensions of 15 mm. each in the left eye, and of 13 mm. each in the right one. (The normal size is about 24 mm. in those dimensions; and according to the measurements of Weiss, the eyeballs in this case were smaller than those of the new-born, the same diameters of which are 16·0 and 16·4 mm.). Unfortunately, it was not possible to obtain a correlation with the size of the orbits. The oblique muscles were apparently absent, but the recti were well developed.

A microscopical examination of the right eyeball was kindly made by Mr. Shapland of Moorfields Eye Hospital, through the introduction of Miss I. C. Mann. It was fixed in formalin, decalcified with nitric acid and phloroglucin, embedded in celloidin, stained with haematoxylin and eosin, then sectioned horizontally above (Fig. 1). The report is as follows:—

"Microscopic appearance:—The corneal epithelium is thinned and in places absent (artefact). Bowman's membrane shows numerous rucks and is in places completely destroyed. The substantia propria of the cornea is enormously thickened and fibrotic, and shows marginal deep vascularisation. Descemet's membrane is thickened and thrown into folds. Its endothelium is flattened. The anterior chamber is largely obliterated, there being a wide peripheral anterior synechia on each side. There are also anterior synechiae at the pupillary border of the iris on each side. The iris stroma shows a moderate infiltration with small round cells, and there is a considerable degree of atrophy of the pigment epithelium. There is ectropion uveae on each side. The lens is largely undeveloped, but the anterior lens capsule can be recognised lying curled up behind the iris in the pupillary area. The retina is quite undifferentiated and the seat of considerable neuroglial proliferation, which fills the entire vitreous chamber. There is considerable proliferation of the pigment epithelium posteriorly, and here it has formed columns and apparent tubules which give the appearance of a glandular epithelium. There is considerable formation of bone in this region and on the inner surface of the choroid. The ciliary muscle is well developed, but the ciliary processes are much flattened and elongated. The choroid is thickened and shows a considerable degree of fibrous tissue overgrowth. It also shows a moderate degree of small round cell infiltration. The lamina vitrea can be recognised in places as a corkscrew-like band of elastic tissue immediately external to the zone of proliferating

pigment epithelium. The optic nerve shows neuroglial proliferation." (Moorfields report 108/op/37 of 3.3.38.)

The left eyeball likewise had normal recti muscles and the obliques seemed absent. Divided sagittally by us, it showed similarly an enormously thickened sclera, but within the globe there were present even greater abnormalities. The choroidal ossification was far more extensive and formed a cup-like

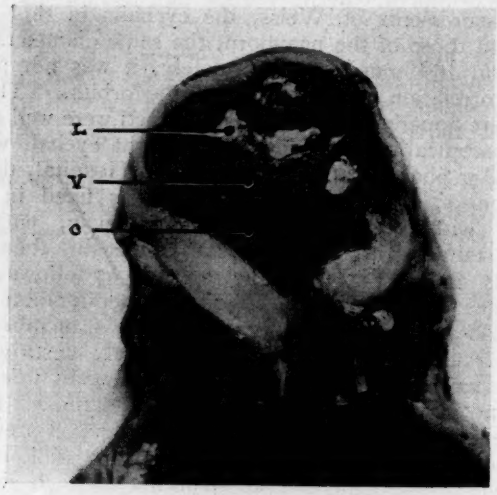

FIG. 2.

Gross section of the left eye of D.115, sagittally cut. There is a similar thickening of the sclera. The choroid (C.) shows further extension of ossification. V. represents the vitreous, entering which behind is a persistent hyaloid artery. L. is a calcareous mass representing the lens, and obliterating the anterior chamber. ×3.

thickening, within which lay a mass of proliferated tissue representing the vitreous (to which ran apparently a well-marked persistent hyaloid artery, well displayed in the figure). In front of this, a large calcareous mass represented the lens and obliterated completely the anterior chamber. There was also a large calcareous plaque in the vitreous, seen on the right side of the photograph. The ciliary bodies were prominent.

The optic nerves were large near the eyeballs, due to thickening of the sheath together with neuroglial proliferation, but became ribbon-like towards the chiasma, which was also greatly reduced in size. Only a few thin beaded myelinated fibres were present in the nerves.

FIG. 3.

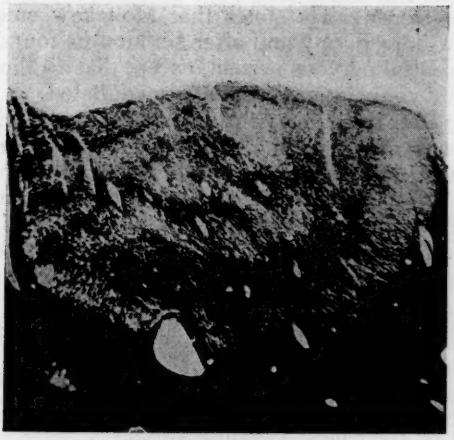

FIG. 4.

Microphotographic sections of the lateral geniculate bodies, showing differences in size and lamination between a normal subject (3) and the defective one (4). Stained Weigert-Pal method for myelin. ×13.

The optic tracts were mere threads, containing scattered myelinated fibres in a dense neuroglial matrix.

The lateral geniculate bodies.—On inspection it was obvious that these were considerably smaller than normal (about half-size). On sectioning, the usual laminated appearance was seen to be grossly disturbed in both myelin and nerve-cell preparations. The number of finer myelinated fibres was obviously less than usual. The nerve cell bodies were not arranged in the normal evenly spaced-out state, but were small, reduced in numbers and patchily distributed throughout, and showed an abnormal variability in size. An increase in fibrous neuroglia was present in the left lateral geniculate as compared with a normal control (Holzer stain). There was no increase in the normal lipoid content of the nerve cells; in fact, owing to the small size and immature appearance of many of them, rather less than normal.

The superior *quadrigeminal bodies* were of the usual size, and showed no histological differences from the normal, the lamination and cells being regular (myelin and nerve-cell stains).

The left *optic radiation* was quite well-developed as traced throughout, and histologically its fibres were definitely fully myelinated.

It may be added for comparison that Woollard (1926), in his investigation of the anophthalmic puppy referred to above, found the optic nerves, chiasma and tracts were thread-like, but the pulvinar, lateral geniculate and superior quadrigeminal bodies were well developed. He states that Monakow enucleated both eyes in a new-born puppy and after six months found no changes at all in the central nervous system, except that all the fibres going to the occipital convolutions were non-medullated.

The brain, after injection with 10 per cent. formol saline through the orbits, was removed and suspended by the middle cerebral arteries in a bucket of the same fluid to avoid distortion during hardening. As a whole it showed no gross abnormality save a mongoloid flattening and reduction in size of the right occipital lobe (in harmony with the malformation of the skull). This character may be illustrated by its " tongue-ing " or backward projection (taken dioptrically from the mid-point of a line dropped vertically from the parieto-occipital sulcus to the base-line of the hemisphere, thence to the extreme pole) measuring only 2 mm.; whereas in the average Mongol brain it was found to extend 8 mm.; in the defective 10 mm.; and in the normal 15 mm., along similar lines on their mesial surface views.

The " Brain Product " (which is the simplest comparative index of its bulk, and estimated by multiplying together the length, breadth and heighth of the cerebrum, and taking the first three figures of the result) gave in this case a figure of 238 against an average normal one of 248 (in 78 cases), and an average

defective of 203 (in 100 cases). The right hemisphere was 156 mm. long, the left 160, against a normal average of 169mm. and a defective average of 156 mm. The cortical surface " receptor and effector areas " of Berry were within the planimeter dioptric normal ranges. The weight of the right hemisphere stripped and drained, was 528 grams, that of the left 546, contrasting with a normal of 554 for each; or a total of 1,074 against 1,108 grams. for the cerebrum. Therefore, the brain of D.115 weighed less and was a little smaller than an average normal one; it was considerably larger, however, than those often found in imbeciles. The cerebellum and brain-stem were of normal dimensions.

The reduction in bulk of the right occipital lobe as compared with the normal (which can be seen in Figs. 5 and 6) was shown by devising an " occipital product " of three dimensions taken on the mesial surface of the sectioned brain: length (from just below splenium to extreme pole), height (from the parieto-occipital sulcus to lowest point of pole), and thickness (from just behind splenium to most prominent part of opposite surface, by calipers). The findings were:—

		Whole Hemispheric Product	Occipital Product	Percentage of Occipital to whole Product
Average of 13 Normals.	R.H.	123·2	17·5	14·2
D.115 Right	H.	119	10·6	8·9
Left	H.	119	11·6	9·7
Difference	R.H.	4·2	6·9	5·2
	L.H.	4·2	5·9	4·4

The *pattern* of the cortical sulci and gyri was fairly normal, save for the following features: On the lateral aspect each central sulcus of Rolando only just reached the upper margin of the hemisphere; the right one simulated a bipartate condition by the presence below of a well-marked tri-radiate subcentral sulcus. The right occipital gyri were narrow, crowded and irregular, especially towards the pole, whereas those on the left were perfectly developed. The left temporal pattern was most irregular; the superior gyrus being broken about its centre, the anterior half tapering off behind, and the posterior half running into the middle gyrus; the inferior gyrus was badly marked and

broken up. The insulae were well operculated on both sides. For the rest of these surfaces, nothing was evident that could not be counterparted in normal hemispheres.

On the mesial aspect of each hemisphere, apart from the visual area, there was little to note. The corpus callosum was slender in the middle but of normal area in section. The cingulate sulcus was normal on the left but irregular and did not reach the upper margin of the hemisphere on the right, a feature, however, not uncommon in our series of 100 normal brains.

The visual area.—The superficial or surface extent of this on the mesial aspect of the occipital lobes was measured by the perimeter on dioptric tracings. The areas taken included both visuo-sensory and visuo-psychic subdivisions, following the delineations of Elliot Smith and von Economo. By actual comparisons, and further illustrated as a percentage of the whole hemispheric area from this view, they show striking differences from the average findings in a group of normal brains. (Measurements in square inches):—

	Visual Area	Whole Area	Percentage
Average of 13 Normals. Right H.	3·26	21·19	15·38
D.115. Right H.	1·91	20·38	9·37
Left H.	1·76	20·38	8·63
Difference R.H.	1·35	0·81	6·01
L.H.	1·50	0·81	6·75

The subdivisions of the area (again using Elliot Smith's mapping, confirmed by von Economo's cellular method) were, in square inches:—

R.H. striate, 0·72, parastr. 0·74 and peristr. 0·45
L.H. ,, 0·82, ,, 0·80 ,, 0·14

The whole right area = 1·92.

A normal one gave striate 1·52; para. 1·08; peri. ·58.

The whole = 3·18; thus showing a marked reduction in the defective, even allowing for the smaller brain size.

The cuneus was small on the right, the posterior calcarine sulcus making a " cuneal angle " with the parieto-occipital sulcus of 74°, and on the left one of 75·5°. A normal, we found, is about 89°, but with a great range of variations.

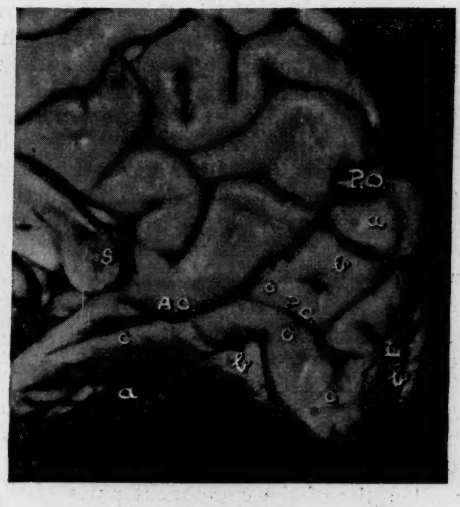

FIG. 5.

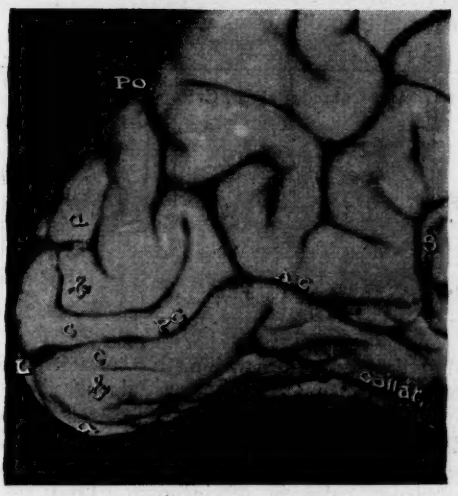

FIG. 6.

Cortical visual area maps of mesial surfaces of the occipital pole in the brain of D.115, right (5) and left (6) hemispheres. The c, b, a, areas are Economo's cellular markings, corresponding to the striate, para-striate, and peri-striate ones of Elliot Smith, and confirmed by histological sections. A.C. and P.C. are the limbs of the calcarine sulcus, and L. is the lunate sulcus. P.O. is the parieto-occipital sulcus, and S. the splenium. Natural size.

The general pattern of the sulci in this region showed marked difference on the two sides. The left presented an almost perfect one (according to the mapping of Elliot Smith), there being a long posterior calcarine passing on to the pole and bifurcating against the roll of a lunate sulcus; there were superior (or limiting cuneal) and inferior (limiting lingual) shallower sulci, dividing superficially his striate area (the O.C. of von Economo) from the para-striate (O.B.); the peri-striate (O.A.) was marked from the latter by a transverse collateral sulcus. Above, the forward extent of the peri-striate area (O.A.) was as usual buried in the posterior wall of the parieto-occipital sulcus. These markings were supported by histological examination.

But on the right side there was a crumpling up and distortion of the whole area (though the microscope again gave verity to the more difficult interpretation of this map). The posterior calcarine was very short, and entirely confined to this aspect even with its forked ending, which was semicircled by a lunate sulcus, also on this surface.

The surface lengths of the component parts of these calcarine sulci, measured by a specially designed graduated wheel on dioptric tracings, may be of interest, if difficult of interpretation. The measurements in millimetres were:

		Ant. Calc.	Post. Calc.	Fork.	Total length.
Normal average of 57	R.H.	26·3	37·9	12·7	78·7
D.115	R.H.	28·0	18·0	6·0	52·0
	L.H.	21·0	28·0	11·0	60·0

indicating that the reduction in length was at the expense of the two later added components (the retinal macular ones) of this system, though, as noted below, there was compensation by greater depth on the right side. The right whole calcarine sulcus showed a more marked downward curve than the left. The depth of these calcarine sulci is of interest. That of the anterior calcarine taken in its centre was 7 mm. in both hemispheres. In the left posterior calcarine, the depth was 12 mm. but in the right it was 18 mm., giving a compensation for its shorter surface appearance. There was no under-folding extent of the cortex at the bottom of the sulci.

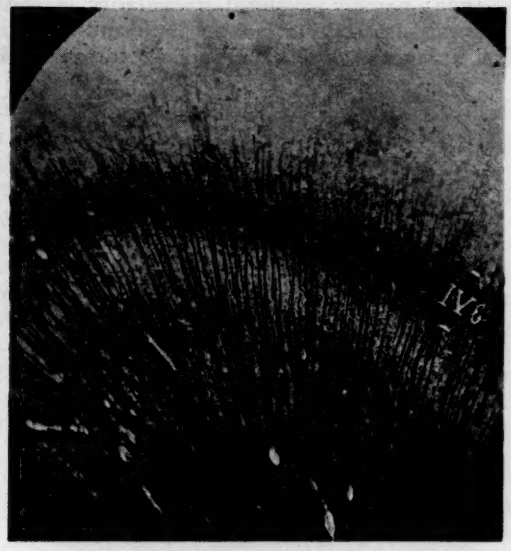

FIG. 7.

Showing the stria of Gennari (iv b.) present in the defective brain of D.115. (Section taken from about first third of the posterior calcarine sulcus. Stained for myelin.) ×40.

The cortex, histologically examined, showed in general only those changes which are commonly found in the brains of mental defectives of no particular pathological type. In the para — and peristriate areas of Elliot Smith (areas 0B and 0A of von Economo) a slight irregularity in the arrangement of nerve cells was observed in the supra-granular layers, the normal well marked columnar arrangement being in places disturbed. The nerve cell bodies appeared unduly small and the Nissl's bodies stained poorly. This contrasted with the much better staining of sections taken from the parietal and frontal cortical areas. Myelin staining also showed no gross abnormality, a well-marked stria of Gennari being present and the normal transitions between the granular type of cortex (O.C.) and the para-striate type (O.B.) were constantly observed. The wealth of finer fibre content was, however, less than in normal controls. Stains for fibrous glia showed no abnormality. There was no appreciable diminution in cortical depth of grey matter compared with the normal.

As regards the cortex elsewhere, in the frontal, parietal and temporal regions one would say that a change was seen similar

to that found in other mentally defective brains of no special pathological type; namely, a slight irregularity in the arrangement of the pyramidal cells, a lack of uniformity in size, and a tendency for clumping together of poorly formed cells in the

FIG. 8.

View of the visual cortex in the same subject to show cell lamination. (Taken from same region as Fig. 7. Stained with cresyl-violet.) ×60.

supra-granular layer. In some sections the pyramidal cells seemed reduced in number, but never to the gross extent seen in cortical atrophy. The cortex of the angular gyrus, described as the " centre " for " word-blindness," among other functions, showed no special configurative or cellular abnormality.

Comments

It is difficult to distinguish the effects of two different factors making for abnormality in this brain, the first being the general one of mental deficiency, the second the specific factor of lack of stimulation of the visual areas by impulses from the malformed eyes. In the main, it may be said that all the minor abnormalities found could be paralleled by other imbecile cortices in which peripheral blindness had played no part in the aetiology of the

mental defect. A slight suggestion of specific inferiority of the visual areas was given by the fact that the nerve cells in these areas appeared less well developed than those of other parts of the same cortex, but it is impossible to rule out purely technical reasons for such an impression.

In the lateral geniculate bodies, on the other hand, abnormal changes were much more obvious. In addition to their poor development as a whole, there was evidence of atrophy (areas of reduced numbers of cells and gliosis). It is well known that optic atrophy may give rise to trans-synaptic degeneration of the nerve cells of these bodies. In this case, where a combination of simple development defect and degenerative pathological changes have both occurred in the eyes, it would seem probable that a somewhat similar condition has arisen in these nuclei, the end result being a disturbance of their normal structure (faulty lamination), coupled with mild pathological changes of a secondary character. It is presumably owing to the comparatively slight extent of the latter process that such insignificant changes were present in the visual areas.

The atrophy of the lower pathways in the optic nerves, chiasma and tracts again might in development be expected from their deprivation of light impulses. But as regards the normal appearance and composition of the superior quadrigeminal bodies, a retinal pathway to them is now denied by some authorities, and here is obviously quite absent; one may therefore conjecture whether the fibres which these bodies receive from the visual cortex through the optic radiations, from the spino-tectal tracts, medial lemniscus, and other sources, do not convey sufficient stimuli, should such be necessary, for their full development.

The gross malformation of the one right occipital lobe must be considered as adventitious and merely concomitant with the imbecility; and, in view of the other defects in this brain, could not have been the real or sole cause of the mental impairment, which is to be sought, so far as present methods avail, in the diffuse slight irregularities present in the cortex.

It is to be added as regards this investigation, that the general dimensions of the types of brains were supplied by the records of the large series of normal (100) and defective (nearly 200) ones in the Stoke Park Collection. But particular measurements and comparisons were made on the same series specially for this article, and they form one part only of an extensive range of studies thereon, as yet unpublished. This part of the work has been aided by a grant from the Colston Research Fund of Bristol, which is hereby gratefully acknowledged. And an appreciative note should be made of the services of the technical Assistant at Stoke Park, Mr. H. D. Steele.

Summary

(1) A microphthalmic imbecile 17 years of age, with a unique ophthalmological family history, presented at autopsy special features in his eyeballs and visual tracts.

(2) The eyeballs were completely disorganised and could never have transmitted light—equivalent to an anophthalmic condition.

(3) The effects of this deprivation of light impulses were reflected in a pronounced poorness of development of the optic nerves, chiasma, tracts and lateral geniculate bodies.

But beyond this region :—

(4) The superior quadrigeminal bodies were quite normal in size and structure.

(5) The optic radiation was well formed and its fibres were myelinated.

(6) The cortical visual areas, though their surface extent was much less than usual and one was grossly deformed, presented a normal lamina granulosa and a well marked stria of Gennari.

(7) The imbecile condition is possibly explained by an imperfect general cortical cellular composition; for there were no gross cerebral pathological lesions present.

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ANNOTATIONS

Mass Testing of Colour Vision

Berens and Stein have devised an ingenious method of testing the colour vision of a large number of persons at one session and thereby effecting a considerable saving of time. It is a method that would be of some service in examining groups of applicants for appointments in those branches of the public services (civil servants, mariners, aviators and railway employees) in which certain standards of colour vision are necessary and it might well be extended to some industrial occupations, to drivers of motor vehicles and to schools.

The standard colour vision charts of Ishihara and Stilling are photographed with a 35 mm. Kodachrome film and then copied by a miniature camera, used in conjunction with the copying accessories, and made into 2×2 inch lantern slides. These when thrown on to a glass bead screen by a miniature lantern slide projector gave results identical with the control tests on the original test plates.

The examination is carried out in a semi-darkened room and each candidate has a printed slip with key numbers corresponding to the order in which the slides are projected and opposite each number he notes the figure he identifies on pseudo-isochromatic charts projected on the screen.

Ishihara and Stilling slides may be interchanged or the order varied in making repeated or annual examinations.

The malingering tests, threshold tests after the Young method, the Edridge Green and other lantern tests, Worth's four dot test and its modifications and the kindergarten chart may be projected.

Visual acuity need not be normal for these tests for the images are easily magnified.

Berens and Stein suggest that by this method it may be possible to educate colour blind persons to differentiate various colours in coloured slides of scenes.

Such mass testing of colour vision from time to time would also have the advantage of revealing disturbances of colour vision due to toxic amblyopia and optic neuritis.

BERENS, C., and STEIN, L.—*Jl. Amer. Med. Assoc.*, Vol. CXIII, p. 1563, 1939.

Some Ophthalmic Army Problems

The following facts which have been given us by an ophthalmic surgeon of acknowledged reputation will, we think, be of interest to our readers and are worth the consideration of the authorities.

Among 267 soldiers examined for errors of refraction between September 14, 1939, and March 13, 1940, amblyopia of the right

eye sufficient in degree to prevent the use of the Bren gun was present in 32 cases, a percentage of 11. There was one case of trachoma which may possibly have been infected in barracks. Among the rest occurred two cases of nystagmus and a single case of total colour blindness and myopic choroiditis respectively. Of these the most important items are the first and second. The Bren gun cannot be used from the left shoulder and it demands fair vision in the right eye. The case of trachoma may possibly be the needle in the haystack. The diagnosis of an early case of trachoma is never plain sailing. It demands the use of the slit-lamp and the microscopical examination of epithelial scrapings as well as considerable experience of the disease. It would not be fair to the members of the recruiting boards to make too much of a single case, but if other cases are admitted or if cases become infected after joining up, the results may well prove disastrous.

It cannot be too strongly emphasized that, though trachoma fortunately is not very common among the general population of Great Britain, there exists in "pockets" here and there quite enough to make possible the passing of an infected recruit. Every case with reddened eye lids and signs of conjunctival infection should be specially examined in order to exclude the possibility of trachoma; while doubtful cases should be referred to an ophthalmic surgeon of experience in the diagnosis and treatment of early cases and the military decision postponed until the candidate has received a clean bill.

ABSTRACTS

I.—CONJUNCTIVA

(1) **Grancini (Milan).—A case of Parinaud's conjunctivitis due to infection by bacterium pseudotuberculosis rodentium. (Sindrome oculo-glandolare-congiuntivite di Parinaud-data dal bacterium pseudotuberculosis rodentium).** *Boll. d'Ocul.*, March, 1939.

(1) The case recorded in this paper is that of a boy, aged 16 years, who, while bicycling, was struck in the eye by a fly, which he removed by means of his handkerchief. All immediate discomfort ceased but four or five days after, the boy had an acute attack of fever with headache, pain in the throat and general disturbance of health. Later while the fever diminished, the left eye became swollen and red, and there was photophobia and slight discharge. Since the symptoms did not lessen the boy was brought to the clinic. There was noted intense oedema of the lids, so that

the eye appeared closed; on everting the upper lid the upper part presented a number of large nodules specially on the outer side. The bulbar conjunctiva was red and chemotic. Just above the limbus, at 12 o'clock, there was a greyish nodule with a small central ulcer; the cornea in the neighbourhood of the ulcer showed slight diffuse opacity and the presence of many vessels. The submaxillary and preauricular glands were enlarged and slightly tender to touch. The appearances were characteristic of Parinaud's conjunctivitis, and the search for the cause was begun. After a good deal of difficulty, a bacillus was isolated from the excised preauricular gland, which showed the characters of the bacillus pseudotuberculosis rodentium. All cultivations from the conjunctiva were negative. There seems no doubt that the condition of Parinaud's conjunctivitis may be caused by a number of bacilli and the difference in severity depends less on the nature of the infection than on the receptivity of the subject attacked; it would be more scientific, therefore, to drop the personal name, and to call the disease by the name of the infecting agent.

HAROLD GRIMSDALE.

(2) **Scardaccione (Rome).—Primary epithelioma of the Meibomian glands with epithelioma of the cornea from contact. (Epitelioma primitivo delle ghiandole di Meibomio con manifestazioni blastomatose della congiuntiva tarsale ed epiteloma da contatto della cornea).** *Boll. d'Ocul.*, April, 1939.

(2) Primary carcinoma of the Meibomian glands is not a common condition, and extension of the disease by contact is very rare. In the case described here, there had been swelling and discomfort of the lower lid for about two years; for six months the patient had noted some loss of sight in that eye. Examination showed a tumour of the lower lid not adherent to the skin except near the palpebral margin. The conjunctiva of the fornix was normal but near the cornea there was some thickening which extended into the cornea; this mass seemed made up of a grey stroma with many new vessels. It projected some 2 mm. from the plane of the cornea. The diagnosis of primary epithelioma of the Meibomian glands with probable epithelioma of the cornea was made. Treatment was removal of the corneal mass with accurate use of the galvanocautery afterwards; a few days later the mass in the lid was excised; the normal skin was retained but all the affected tissue was removed down to the lower fornix. Then the upper lid was split and the lower border of the tarsal plate secured to the lower conjunctiva. The skin of the lower lid was stitched to the anterior layer of the upper.

After three months the lids were separated by an incision along the line of the lashes of the upper lid. Microscopical examination

showed the presence of a primary epithelioma of the Meibomian glands, and epitheliomatous metamorphosis of the tarsal conjunctiva corresponding. Further an epithelioma of the cornea. This last was thought to have been caused by contact with the diseased conjunctiva.

HAROLD GRIMSDALE.

II.—CORNEA

(1) **Dalsgaard-Nielsen, E. (Copenhagen).—On the recurrence of syphilitic interstitial keratitis. On the acuity of vision and the causes of impairment of vision in patients with past syphilitic interstitial keratitis.** *Acta Ophthal.*, Vol. XVII, pp. 38 and 43 respectively, 1939.

(1) In the first paper **Dalsgaard-Nielsen,** on the strength of re-examination of 173 patients with previous interstitial keratitis, holds that there is no evidence for recurrence of this affection. What has been regarded as a recurrence of the corneal lesion is only a flare up of iridocyclitis.

In the second paper a review is given of the varying estimates of permanent visual damage in cases of interstitial keratitis, the incidence of blindness being given as from 3 to 19 per cent. by different authorities. Considerably varying incidences of full recovery has also been given. Her own investigations show blindness in 2 per cent. and vision ranging from 6/18 to 6/6 in 87 per cent., if the better eye is considered. She also discusses the incidence of various complications, such as corneal opacities, myopia and astigmatism and such a late sequel as secondary glaucoma. Statistical information is given on the incidence of fundus lesions; in her series 16 per cent. showed choroiditis. Disseminated choroiditis is more common than anterior choroiditis; the salt and pepper type and the bone-corpuscle type of reactions are rare.

ARNOLD SORSBY.

(2) **Dalsgaard-Nielsen, E. and Osterberg, G. (Copenhagen).—Ulcus Rodens Mooren.** *Acta Ophthal.*, Vol. XVII, p. 28, 1939.

(2) **Dalsgaard-Nielsen** and **Osterberg** describe two cases of rodent ulcer of the cornea with a histological study of one of them. The significant finding was the considerable alteration in the vessels in the whole of the corneo-scleral junction, and not merely at the site of the ulcer. They hold that this supports the view that Mooren's ulcer is of vascular origin, though they consider it possible that there are several clinical and pathological types.

ARNOLD SORSBY.

(3) **Rosengren, B. (Gothenburg).—Treatment of ulcus serpens corneae with M and B 693.** *Acta Ophthal.*, Vol. XVII, p. 209, 1939.

(3) **Rosengren** reports five cases of serpigenous ulcer of the cornea treated by M. and B. 693. Admitting some uncertainty of judgment in some cases, he holds that the effect of the preparation was undoubted.

ARNOLD SORSBY.

(4) **Pergola (Eritrea).—A case of corneal herpes associated with the Claud Bernard-Horner syndrome. (Su di un caso di erpete della cornea associato a sindrome di Claud Bernhard-Horner).** *Rass. Ital. d'Ottal.*, March-April, 1939.

(4) The patient, a man aged 43 years, was struck in the left eye by a fragment of stone. The eye was very photophobic and watered much; it was painful; there was a small ulcer on the lower outer side of the cornea. Within a short time the ulcer was seen to be surrounded by small vescicles; the iris was congested and the pupil small. Later the corneal epithelium showed dendritic losses; there were signs of affection of the sympathetic; enophthalmos, miosis, the opening of the lids was reduced; the sensibility of the cornea lessened; intra-ocular pressure lowered. The iris after a time became partially atrophic. This is the typical appearance of Claud Bernard's syndrome. The author thinks that the virus of herpes must have been introduced into the eye by the foreign body which caused the original injury.

HAROLD GRIMSDALE.

(5) **Cardello (Turin).—Herpes cornealis and keratitis disciformis. (Contributo allo studio dell'erpete corneale e della cheratite disciforme).** *Rass. Ital. d'Ottal.*, March-April, 1939.

(5) **Cardello** has had occasion to observe a small epidemic of corneal herpes; all the patients came from the same area; in some it was associated with a severe form of influenza: in two cases the corneal condition changed into keratitis disciformis; he notes also that treatment with "neurovaccine" (a polyvalent vaccine) gave unusually good results. The author thinks that herpes corneae is a disease on its own: though often associated with other diseases. Carmi has noticed that there is an increase in number of eosinophils in the blood in cases of corneal herpes; this suggests that it is a general toxic-infective disease. Inoculation of animals was followed by encephalitis in many cases.

HAROLD GRIMSDALE.

(6) **Aliquo-Mazzei (Ponti di Arezzo).—Disciform keratitis from vaccine virus. (Cheratite disciforme da virus vaccinico).** *Boll. d'Ocul.*, March, 1939.

(6) It has been shown that disciform keratitis may be due to many causes; while herpes is the most common, vaccinia is not very

infrequent; it has been supposed that this keratitis may arise from an endogenous infection; **Aliquo-Mazzei's** cases go to show that there must be a lesion of the corneal epithelium preceding. Where there is no lesion, infection of vaccinia near the eye is not complicated by this keratitis and even a corneal lesion is not necessarily followed by disciform keratitis. In the four cases recorded here, the cornea was definitely hypoaesthetic.

HAROLD GRIMSDALE.

(7) **Grandi (Padua).—Disciform keratitis treated by Vitamin B. (Un caso di cheratite disciforme favorelmente trattato con vitamina B).** *Boll. d'Ocul.*, March, 1939.

(7) **Grandi** records a case of disciform keratitis in which injections of vitamin B were used with a good result.

HAROLD GRIMSDALE.

III.—LENS

(1) **Salit, P. W. (Iowa).—Nitrogen content of cataractous and sclerosed human lenses.** *Acta Ophthal.*, Vol. XVII, p. 81, 1939.

(1) **Salit** reports on 167 cataractous and sclerosed human lenses which were removed by the intracapsular method and analysed separately for their nitrogen content.

He shows that the nitrogen values in terms of per cent. dry weight are practically the same for all types of cataractous and sclerosed lenses, and average 15·35 per cent. of the whole lens substance, or 16·56 per cent. by calculation, of the pure lens protein. On the basis of wet weight, however, the different types of cataractous and sclerosed lenses differ considerably with respect to their nitrogen content. Lenses with incipient cataracts have an average of 5·32 per cent. of nitrogen. It decreased to 3·98 and 4·11 per cent. in intumescent and mature stages, *i.e.*, by 25·2 and 22·7 per cent. respectively as compared with incipient cataracts. When the results are arranged according to stages of sclerosis, the average nitrogen content for practically normal lenses is 5·36 per cent. It decreases then to 4·83 per cent. during the stages of slight sclerosis and pronounced sclerosis, and to 4·43 per cent. during the stages of very pronounced and highly advanced sclerosis, *i.e.*, by 9·9 and 17·5 per cent. respectively as compared with practically normal lenses. In terms of absolute amounts the respective values are: 10·9, 10·2 and 8·8 mg. of nitrogen per lens.

The decrease in the nitrogen content due to sclerosis alone within the group of incipient cataracts amounts to 7·3 per cent.

during the last stages of sclerosis as compared with practically normal lenses.

There is, therefore, a considerable loss in protein in the senile pathological lens as a result of cataract and pathological sclerosis, and the loss, on the whole, is proportionate to the degree of damage of the lens. Since the loss consists chiefly of the soluble proteins, or crystallins, the insoluble albuminoids are left behind and impart to the nucleus, in which they predominate, an increased rigidity and hardness.

Age, within the limits of 48 and 84 years, has practically no influence on the percentage of nitrogen in the lens. In terms of absolute amounts, there is, however, a tendency for the nitrogen content to increase with advancing age, this being due to increase in the lens mass.

ARNOLD SORSBY.

(2) **Orzalesi (Naples).—Respiration and glycolysis of the cataractous lens. (Respirazione e glicolisi nel cristallino catarattoso).** *Boll. d'Ocul.*, May, 1939.

(2) **Orzalesi** points out that few examinations have been made of the metabolism of the lens in senile cataract. He has found in all cases a weak respiratory activity; he thinks that the completely degenerated lens fibres probably have none, but that in all cataracts, even in those clinically mature, there are some fibres which have not become completely degenerate. This small remnant of the lens is enough to account for the consumption of oxygen which he finds. He notes that glycolysis is even more disturbed than the consumption of oxygen, for he has found it impossible to measure the production of lactic acid. He discusses the modern views on the production of lactic acid from glucose; it seems that phosphoric acid and certain ferments must be present. The author holds that the necessary ferments are not present in the cataractous lens, and that, therefore, glycolysis cannot go on.

HAROLD GRIMSDALE.

(3) **Taliercio (Naples).—X-Ray cataract. (La cataratta da raggi X).** *Ann. di Ottal.*, February, 1939.

(3) The fact of the occurrence of cataract when the eyes have been exposed for a time to the action of X-rays, is well known. **Taliercio** has made this series of experiments in the hope of making certain the method of production. The animals were rabbits, and one eye was protected by a lead shield, to serve as control. All animals with any previous change in the lens were thrown out. The pH of the aqueous, the calcium content of the lens and its weight were noted and compared with the details of the control eye. The amount of oxygen consumed by the dry lens matter and the CO_2 given out or estimated from the lactic acid produced by

glycolysis were estimated also. As a result of these experiments the author finds that the weight of the lens and the calcium content are increased; that the pH of the aqueous is moved towards alkalinity and that the production of CO_2 is diminished. All these changes vary in amount with the anatomical state of the lens.

HAROLD GRIMSDALE.

(4) **Basile (Naples).—Experimental cataract from dinitrophenol. (Cataratta sperimentale da dinitrofenol).** *Ann. di Ottal.*, March, 1939.

(4) The occurrence of a cataract in those persons who have taken *a*-dinitrophenol to reduce weight for any period, is comparatively common; the mechanism of its production is unknown. **Basile** has tried to produce cataract in animals which have taken this drug for considerable periods, in the hope of finding what brings on the changes in the lens; none of the animals showed any opacities in the lenses, though some remained alive under treatment for six months. The question therefore remains unanswered. It is possible that since it is estimated that in men, only one in a thousand develops cataract, the number of animals tested is insufficient.

HAROLD GRIMSDALE.

IV.—MISCELLANEOUS

(1) **Dejean and Ferrié.—Aetiology of visual hallucinations.** *Arch. d'Ophtal.*, June, 1939.

(1) **Dejean** and **Ferrié** have some interesting remarks to make about hallucinations which occur during binocular occlusion after operation. They contend that they are caused by the stimulation of the brain by the abnormal retinal sensation and irritation due to the suppression of light and images, and this conclusion is based on the fact that the retina is the creative centre. They cite three cases where it is emphasised that there was no question of such conditions as senility or cerebral sclerosis. This is in direct contrast to Turc's cases, where hallucinations occurred in patients suffering from senility or cerebral sclerosis, but with good vision, that is, the retina receiving the normal stimulus of light.

1. An N.C.O., aged 70 years, after cataract operation, saw in a corner of the room piles of unironed washing, later replaced by small pieces of wood ready to be made into toys, rain falling on an unploughed field, several people playing a card game, which he was

unable to follow, though an inveterate card player himself, and which was a veritable nightmare.

Of all these things, only the card game can be correlated to his own life.

2. Lady, aged 76 years, after cataract operation, had hallucinations and was delirious. She got out of bed and fell. During the night she wanted to rise and put on her shoes because it was cold, but refused a hot water bottle saying that there would not be room for it in the bed. That is, she had disorders of speech or delirium. In addition to this she suffered from hallucinations. Although aware that she was in hospital, she saw her son, who was a waiter, working in his usual place in the café. On removal of the bandage, delirium and hallucinations disappeared.

In this case the disorders were correlated to things in her own life.

3. Patient with immature cataract, suddenly lost the sight of her eye from retinal detachment, but as she thought the symptoms were due to the cataract, she did not seek advice for six months, during which time she had hallucinations. These included balls of all colours, human heads, dog's heads and pig's heads. Later she saw men and women conversing, but realising they were not real, she drove them off with her hand, whenever they approached. Sometimes she saw cakes and sweets etc. covered with flies and ants, and these flies returned again and again. Then she saw dwarfs who moved about in a Lilliputian land, and amongst them were women even smaller, about 15 cms. in height. An extraordinary thing was that all the people who appeared in these hallucinations wore the clothes of the Napoleon III period. After operation for re-attachment of the retina, which was successful, the hallucinations gradually diminished, and could be dismissed whenever the patient removed the pinhole glasses she was wearing.

The hallucinations could not be correlated to her real life.

In general the hallucinations in these cases were of two species:

1. Without reference to the patient's normal life.
2. With reference to the patient's normal life.

But in contrast to Turc's cases the patients were mentally normal, and had no verbal, auditory or other hallucinations.

The only causal factor was the deprivation of light, and therefore, the cause of the post-operative hallucinations during binocular occlusion, is the lack of light and vision. This abnormal retinal stimulus, the deprivation of light, transmits abnormal impulses to the brain, thus producing abnormal cerebral reactions, the creation of abnormal images, called hallucinations.

W. R. MATHEWSON.

(2) **Burnet, Et. (Tunis).—Les Rickettsias et l'etiologie du trachome.** *Bull. Soc. Path. Exotique*, Vol. XXXII, No. 5, p. 467, 1939.

(2) There are many reasons for believing that the active principle of trachoma is a corpuscular virus of the same type as that of psittacosis and lymphogranuloma inguinale. After the important pioneer work of Halberstaedter and Prowaczek the inclusions in epithelial cells in early trachoma were called by them *chlamyzydzoa*. It is suggested that these corpuscles be called *Prowaczekia trachomatis*.

Weigl, who is the authority on typhus fever, a Rickettsial disease, has announced that the Rickettsiae of type Rocha-Lima have nothing to do with trachoma; Durand and Sparrow have shown that these organisms have no effect on the conjunctiva of man.

The only addition to the observations of Halberstaedter and Prowaczek of an experimental nature are those of Cuénod and Nataf, which consist in the transmission of trachomatous virus (triturated trachomatous conjunctiva) from louse to louse in series, by Weigl's technique of anal inoculation, after which it can produce trachoma in man and apes.

In the intestinal contents of virulent lice which have transmitted trachoma experimentally Cuénod and Nataf have observed Rickettsia-like bodies (which are not typical Rickettsia). They have observed often, but not constantly, Rickettsia of the type Rocha-Lima. They have obtained positive results (experimental trachoma) with lice from which Rickettsia-like bodies were absent. The ability of the lice to conserve the virus of trachoma, therefore does not depend on the presence of these Rickettsia-like bodies, which is another reason for believing that they have nothing to do with trachoma.

We have no absolute proof that the virus consists in the Halberstaedter-Prowaczek corpuscles; it is still possible that they are only a cellular epiphenomenon, and that the virus exists outside them and without them. However there is a very great probability that the hypothesis of this corpuscular virus is correct.

It is true that the brood of lice used by Cuénod and Nataf was found at one time to be infected with Rickettsiae of the type Rocha-Lima, but there is nothing to prove that they have been produced in the lice by trachomatous virus; besides it was not they which produced the experimental trachoma.

The matter may be summed up as follows:—Rickettsiae of the type Rocha-Lima may be dismissed. There is a very great probability that the Halberstaedter-Prowaczek Körperchen are the agents of trachoma; these are not typical Rickettsiae; if they are Rickettsiae at all they are a new type. According to Cuénod and Nataf the trachomatous virus lies in corpuscles which they call

Rickettsia-like, but **Burnet** and most of us think that it lies in Halberstaedter-Prowaczek Körperchen; anyhow it is conserved and transmitted from louse to louse in series by anal injection, and after a series of passages it can produce a typical trachoma in a susceptible animal.

A. F. MACCALLAN.

(3) **Kirwan, Lieut.-Col. E. O'G. (Calcutta).—Transplantation of the cornea: Report of a perfect result.** *Arch. of Ophthal.*, Vol. XXII, July, 1939.

(3) **Kirwan** states that keratoplasty is a comparatively common operation at the Eye Infirmary at Calcutta. Blindness is common and suitable grafting material easy to obtain. In his experience the eyes of donors blind from glaucoma furnish good grafts, and it is unnecessary to choose a donor of the correct blood group. The conjunctival sac must be rendered bacteriologically clean by treatment before operation and if anterior synechiae are present the anterior chamber must be reconditioned.

The case here reported was a Hindu woman, aged 26 years, with one eye practically blind from interstitial keratitis: (vision 1/60). The Wassermann reaction was positive in the blood and preliminary anti-syphilitic treatment rendered this negative. The donor was a Hindu woman, aged 60 years; the eye blind from irido-cyclitis with secondary glaucoma, the result of a couching operation for cataract. There was no keratitis punctata. The diameter of the graft was 4·5 mm., that of the trephine hole in the recipient's cornea, 4·75 mm. The graft was kept in position by two fine silk sutures, one arranged in the form of a cross, the other as an "X." These were passed into, but did not perforate, the cornea adjacent to the site of the graft. They were removed on the fifth day. Two months after leaving hospital vision was 6/18, and at the end of another two months was 6/6. The graft was completely clear and the surrounding cornea had cleared very considerably. The author has noticed this improvement frequently in the past. Later the patient was re-admitted with an acute conjunctivitis in this eye. This cleared up readily and the cornea was unaffected. Vision, 10 months after operation was still 6/6.

In Calcutta syphilis is common and interstitial keratitis frequently occurs in patients of much older age than in Britain. Kirwan thinks that the fellow eye in this patient is almost certain to be affected by interstitial keratitis later on. There is a good illustration of the eye before operation in the text, and a colour plate showing the corneal condition seen with the slit-lamp, before and after the operation.

R. R. J.

(4) **Barrett, Sir James W. (Melbourne).—On the subject of blindness, partial sightedness and the history of the Braille type.** *Trans. Ophthal. Soc. Australia*, Vol. I, 1939.

(4) The subject of Sir James Barrett's Presidential address at the first meeting of the Ophthalmological Society of Australia is sufficiently indicated in the title. He refers shortly to practical attempts at grading soldiers, damaged in the Great War, while he was serving in Egypt and Palestine, to see how the best use of a damaged soldier could be accomplished. At the Royal Victoria Institute for the Blind the British standard has been adopted in the classification of blindness. There is an interesting summary of the causes of blindness in Victoria drawn from the records of the Royal Victorian Institute. The first place is occupied by myopia with 13·5 per cent.; optic atrophy, 13 per cent.; nystagmus, 7·5 per cent.; trachoma and interstitial keratitis, 6 per cent.; ophthalmia neonatorum, retinitis pigmentosa and choroiditis, 5·5 per cent.; sympathetic ophthalmitis, 3 per cent.; injury, 2 per cent. Only two cases were due to glaucoma. The cases of trachoma are old ones, recent trachoma is rare in Victoria to-day.

The education of the partially sighted is admittedly a problem, but it can be done, and Sir James Barrett holds very strongly that no single woman in Australia should be on the dole. The demand for domestic service is never satisfied. Partially sighted women should be trained mainly for domestic service and boys of the same class, wherever possible, in the country.

The final part of the address is an interesting account of the history of Braille.

The prevention of blindness and provision for the education of the partially sighted are among the most important ophthalmic problems. The President of the newly founded Ophthalmological Society of Australia has done a public service to his Dominion by emphasizing their importance thus at the outset of the career of a young Ophthalmological Society, and we feel sure that his address will be a worthy ancestor of fine children in subsequent volumes.

R. R. J.

(5) **Stokes, William H. (Omaha).—Transplantation (implantation) of the lacrimal sac in chronic dacryocystitis.** *Arch. of Ophthal.*, August, 1939.

(5) **Stokes'** operation has been performed by him forty-two times with only three complete failures, and in two of them, the patients did not comply with his request for preliminary nasal treatment. This step is important and the following conditions should be corrected if found—high deviation of the septum, polypoid growths, enlargement of tip of middle turbinate, sinus disease. The operation is carried out under infiltration anaesthesia,

the nose being packed with cocainised gauze. The incision, practically vertical, is 1·5 to 2 cm. long, starts on a level with the summit of the globe and is placed at least 12 mm. from the inner canthus. It is carried down to the bone, which is exposed over the ascending process of the maxilla towards the anterior lacrymal crest. The edge of this is defined, the ligament divided and the periosteum lining the fossa, together with the sac is pushed outward, it is also dissected downward as far as possible into the opening of the naso-lacrymal canal. The sac is freed in its entire circumference and is cut across as far down as possible. Two or three silk sutures are inserted through the mucosa and wall of the sac 1—2 mm. from its cut edge and the sac lifted up and protected with a flat retractor. A trephine 8—10 mm. in diameter is applied to the bone forming the lower part of the ascending process of the maxilla. It should be directed slightly downwards and as nearly as possible at right angles to the plane of the intranasal surface. The trephine should have a centre pin to prevent its slipping. After removal of the bone, the nasal mucous membrane is trimmed flush with the edges of the opening and the old naso-lacrymal duct is curetted to remove its epithelial lining. The silk sutures holding the lower end of the sac are now passed through the new opening in the bone, picked up with a pair of nasal forceps, drawn out of the nostril and secured to the side of the cheek with strapping. The skin wound is sutured in the usual way. The sac sutures are withdrawn on the sixth day, at which time the canaliculus is irrigated with saline.

F. A. W-N.

(6) **Mann, Ida (London)—Some ophthalmic problems in wartime.** *The Practitioner*, p. 174, February, 1940.

(6) The "Black-out" has imposed visual conditions which are new. It must be realized that several factors are at work in determining ability to walk in dark streets on a moonless night. In dim lights vision differs from that in daylight. In daylight the macular cones function and acuity of vision is determined by the condition of the macula and the sharpness of the image formed on it by the refracting mechanism, the periphery of the retina being mainly used to register movement and to assist orientation by stimulating the fixation reflex whereby the macula is turned on the most important object in the field. The cones also perceive colour. In dim lights, however, the peripheral field is at a premium, the macula practically ceases to function and the fixation reflex is in abeyance. Orientation is now entirely by stimuli from the peripheral field and para-macular region, small objects, such as distant stars, being much better seen when not fixed directly. In very dim lights the actual amount of light which enters the eye is of importance and a dilated pupil is an advantage, while in vision in daylight it is a disadvantage. Thus

it follows that for good vision at night the integrity of the field and the freedom of the pupil to dilate are of much greater importance than the condition of the macula and the state of the refraction and accommodation. Spectacle lenses and frames cut out part of the light and part of the peripheral field, so high myopes, wearing their glasses, do not get a large enough field or sufficient illumination, while if they take them off the image formed is dim.

In cases of low myopia and astigmatism it is often better to discard glasses.

A. F. MACCALLAN.

(7) **Busacca, A. (Brazil).—Preliminary note on the presence of trachoma nodules in the pretarsal connective tissue and in the fascia of the orbicularis. (Nota prelimunare sulla presenza di noduli tracomatosi nel connettivo pretarsale e nei fasci del muscolo orbicolare).** *Folia Clinica et Biologica*, S. Paulo, Vol. XI, N. 6, 1939.

(7) In many cases of trachoma in which the operation is suitable **Busacca** performs a combined excision of tarsus and conjunctiva, or tarsectomy. In one of these cases examined histologically he found trachoma nodules or follicles in the tissues which separate the tarsus from the skin, that is in both connective tissue and orbicularis muscle.

Trachomatous infiltration of the tarsus is well-known, but this is the first time that it has been detected in the tissue superficial to the tarsus. This tissue is called by the author "pretarsal" quite rightly; this term is employed by Birch-Hirschfeld and Wilson for tissue which lies between subconjunctival tissue and tarsus however.

A. F. MACCALLAN.

(8) **Weve, H. (Utrecht).—Congenital Aphakia with Hyaloid Artery and Retinal Fold.** *Ophthalmologica*, Vol. XCVII, p. 79, 1939.

(8) **Weve** holds that every transition is to be found between simple arteria hyaloidea persistens and so-called pseudo-glioma caused by congenital detachment. He supports this view by a case report of a patient in whom a persistent hyaloid artery was present with a partial retinal fold. An illustration showing the findings is given.

ARNOLD SORSBY.

(9) **Kravkov, S. V. (Moscow).—The influence of caffeine on the colour sensitivity.** *Acta Ophthal.*, Vol. XVII, p. 89, 1939.

(9) **Kravkov** gives detailed experimental observations from which he concludes that caffeine heightens the colour sensitivity of the eye, particularly to reddish-orange and to green rays. The

effect of caffeine in doses of 0·1 grm. sets in within twenty minutes and lasts for forty minutes. The maximum increase observed in colour sensitivity was 40 per cent.

ARNOLD SORSBY.

(10) **Suurküla, J. (Tartu).—The significance of bacterial flora in conjunctivitis. (Ueber die Bewertung des bakteriologischen Befundes bei Bindehautentzündungen).** *Ophthalmologica*, Vol. XCVII, p. 20, 1939.

(10) **Suurküla** stresses the fact that neither film preparations nor the examination of epithelial scrapings show clearly whether organisms found in the conjunctival sac are responsible for a given conjunctivitis. He stresses the value of culturing the organisms found and indicates that many types of conjunctivitis regarded as inflammatory are really allergic in origin.

ARNOLD SORSBY.

(11) **Doherty, W. B. (New York).—The new orbital implant.** *Amer. Jl. Ophthal.*, Vol. XXII, p. 419, 1939.

(11) **Doherty** suggests that vitallium, a casting alloy composed of 90 per cent. cobalt and chromium and a small percentage of endybdenum would make a useful orbital implant on account of its physical properties. It is strong, hard, very light, completely inert, most compatible with living tissue and produces no tissue nor electrolytic reaction. Its specific gravity is 8·29.

It has already received a trial in dentistry and in the treatment of fractures by plates and pins.

H. B. STALLARD.

BOOK NOTICES

Modern Trends in Ophthalmology. By FREDERICK RIDLEY and ARNOLD SORSBY. Roy. 8vo. Pp. 699, with 8 Colour Plates and 271 Illustrations. London: Butterworth & Co., Ltd. Price 30s.

Modern Trends in Ophthalmology is arranged in seven sections and has chapters by 55 authors. These have been drawn from three continents. Each chapter is by an acknowledged expert in its subject matter. Here is discussed "the as yet unsystematized knowledge that is emerging from clinics, laboratories and the periodical literature." The editors have decided not to "emphasize what is already established or that which is as yet unformed, but to indicate emergent tendencies and formative influencies." They

point out that the book is not intended to cover the whole field of ophthalmology. Each author gives a selected bibliography at the end of his chapter sufficient to enable the reader to follow up his subject and whereby he can get further references if he wishes.

The contents are of so diverse a nature that it is impossible within the compass of a short review to give an adequate idea of the whole. We may say that the seven sections into which the book is divided are as follows: "ophthalmology in relation to general medicine; diagnostic procedures; refraction and binocular vision; physiology of vision; some newer conceptions in pathology; treatment; and social aspects." The first section contains twelve chapters, the last, four, the remaining sections, from eight to ten each.

The editors are to be congratulated on having got such a team of authors together and on the excellency of the results. It is not always easy in a book by multiple authors to avoid repetition and overlapping. In this instance when the subject matter of one chapter has any bearing on the contents of another a cross reference to the particular pages is given and the whole is welded together into a book which makes stimulating reading and is well worthy of a place on the shelves of every ophthalmic surgeon.

Mr. Ridley contributes chapters on the intra-ocular pressure and on the tears. They are comparatively short and yet clearer than many other accounts which we have read, especially in the first of the two subjects.

Mr. Sorsby has written at greater length on hereditary syndromes with ocular manifestations, vital staining, the problem of myopia and the abiotrophies. These are subjects which he has made his own and the results deserve high praise.

Of particular interest at the present time are the chapters on ophthalmology in aviation, by Wing Commander Livingston and chemical warfare and ophthalmology, by L. T. Poole, of the pathological department of the Royal Army Medical School.

In more general matters we commend the chapters on allergy and immunity in ophthalmology, by Alan C. Woods; psychological factors and eye affections, by Millais Culpin; retinal and choroidal arterio-sclerosis, by J. E. Friedenwald; skin diseases and ophthalmology, by Grönblad; heredity, by Waardenburg; the diagnosis of the pre-glaucomatous state, by Gradle; ophthalmic instruments by Elmsley and Fincham; colour photography, by Bedell; contact lenses, by Thier; colour vision, by W. D. Wright; tumours of the retina, optic nerve and choroid, by Grinker; physical therapy in eye disease, by M. Klein; diathermy in treatment of retinal detachment, by Weve; corneal transplants, by Filatov; prevention of industrial ocular injuries, by the late H. V. Würdemann and Brugman; and the welfare of the blind, by L. M. Nava, of London.

This very short list is picked at random and gives some idea of

the feast that awaits the reader, and the other chapters, which we have not mentioned, are all equally good.

The publishers have done their share well, the illustrations have been well chosen and reproduced and there is a comprehensive index. We noticed very few typographical errors.

Pseudo-tuberculosis in Man. Part 1. Besnier Boeck's Disease. By Professor L. SNAPPER and Dr. A. W. M. POMPEN. **Part 2. Regional Ileitis.** By Professor L. SNAPPER and Dr. EWEN F. BOHN. N.V. Harlem. 1938. Price, H.fl. 7·50.

This work is the publication of lectures given at the University of London in November, 1937.

Part 1 is of more interest to ophthalmologists than part 2 which concerns particularly the general surgeon. It contains a good review of the history of Besnier-Boeck's disease, its clinical features and pathology. There are some excellent plates of photomicrographs of sections through the lesions of this disease and radiographs showing the changes in the lung fields and the bones of the hand. The description of the eye lesions associated with this disorder is brief and there are several important omissions, in particular the decrease of intra-ocular pressure that is a sequel to iridocyclitis in some cases, and the incidence of keratitis and complicated cataract.

The cutaneous lesions which are bizarre in this disorder are not dealt with so fully in this book as they are in the writings of other authors.

The printing and reproduction of the work is admirable.

Syphilis and its accomplices in mischief: Society, the State and the Physician. By GEORGE M. KATSAINOS, M.D. Pp. 676. Privately printed at Athens. Price, 5 dollars.

At the conclusion of this book is written the following sentence "A disease, the very name of which is prudishly avoided by the lay press, and the victims of which society hates and condemns, the state persecutes and punishes, and the medical profession deceives and plunders, and which is impossible to fight in the open, cannot be defeated, conquered, and consequently exterminated."

The majority of medical practitioners would not agree with such an opinion. The book is too one-sided to deserve wide reading. It contains many classical quotations from ancient Greek literature and suggestions for alterations, based on the Greek language, of medical terms in modern use.

Some of the subject matter is quite irrelevant, for instance over two pages are devoted to the praise of the superiority of Germany in science, culture, art, education and commerce in 1914, to a justification of all she did in the 1914-18 war and to bitter attacks on her conquerors.

The British Orthoptic Journal. Vol. I. No. 1. 1939.

This new journal is published under the auspices of the British Orthoptic Society, a body which has recently been registered in the National Register of Medical Auxiliary Services. The journal contains a preface written by Mr. C. L. Gimblett; the President's letter from Miss N. C. Maddox (Mrs. Lowndes Yates); and an editorial by Miss Sheila Mayou. It seems that there are at present two local branches of the British Orthoptic Society, one in London and the other in the Midlands, which hold meetings at which papers are read and patients are shown. The Chairman's reports of these two branches are set out.

Volume 1 also contains papers read by ophthalmic surgeons and orthoptists before the meetings of the Society in 1937 and 1938. These deal mainly with the orthoptic treatment of squint and heterophoria, the routine of the orthoptic department at the Manchester Royal Eye Hospital, the "suitability of cases for orthoptic training," occlusion, loss of central fixation, voluntary diplopia and problems concerning divergent squint. Mr. Gimblett's paper on the history of orthoptic treatment is reported and there is a short and interesting paper from Miss Ida Mann on "Certain aspects of the evolution of the eye," which deals with ocular muscle balance and stereoscopic vision as the latest acquisition of the vertebrates in phylogeny.

Five lectures by Wing Commander Livingston entitled an "Approach to the phorias" are included in this volume.

At the end there is set out a standard of cures proposed for various types of squint and heterophoria; and a register of the members of the Society with the towns and hospitals at which they practise, including those overseas.

There is a review of a book on Ophthalmic Nursing, a bold undertaking for the orthoptist who has signed her name beneath the review. It is obvious that an orthoptist is unlikely to detect deficiencies and inaccuracies that are evident to a medically trained reader.

In this journal there is a need for more careful editing. In the list of contents there is marked inconsistency in the titles of the contributors particularly among those who are medically qualified, some have the prefix Mr., others Dr., some no prefix at all; medical degrees are placed after some names and not after others, and these particulars on the title page do not correspond with those on the page in which the paper appears. The introduction of abbreviations unfamiliar to some readers is undesirable and the italization of words such as "can" on which emphasis is laid is unnecessary. There are a number of other minor mistakes in the text such as "inter-cranial disease," and the use of some loose, ill-defined terms.

The journal will interest ophthalmic surgeons as well as orthoptists and we wish the British Orthoptic Society success in this venture.

A Guide to Ophthalmic Operations. By J. BRUCE HAMILTON, M.B., CH.M.(Syd.), D.O.(Oxon.), D.O.M.S.(Lond.). Pp. 202, Illustrations 7. London: H. K. Lewis & Co. Price, 10/6.

This little book is set out in note form for the purpose of guiding the nursing staff in the eye department of a hospital or in a private nursing home. It contains instructions about the pre-operative preparation of a patient, details about the transport of the patient from the theatre to the ward, post-operative treatment and convalescence. There are lists of the instruments required for all the commoner eye operations and notes about the preparation of a dressing trolley. Details are given about the preparation of medicaments for use before, during and after operation, there are also notes about the sterilization of drops, dressings and instruments. The care of eye surgical instruments is described.

The book is difficult to read, there is much repetition and inconsistency of spelling. For instance atropine appears atropinae, atropin and atropine. On page 12 normal saline is stated erroneously to be a 9 per cent. solution. There is also a need for careful proof correcting should another edition be published. Many proper names of drugs and instruments should be set up in "lower case" instead of capitals, and the latin translations should be verified.

The name of the book is misleading for there is no description of the principle or practice of various eye operations. The reviewer feels that the author would have achieved his object better if he had been more discursive and had not indulged in the long lists and abbreviated notes which form most of the book. Chapters devoted to the posture of the patient after operation, diet and methods of feeding, complications and convalescence together with a brief account of the object to be obtained in eye operations would have enlivened the text and made its reading less dull for the eye nurse.

Polychromatic Plates for Testing Colour Vision. By Dr. E. B. RABKIN, Director of the Ukranian Hirshman Memorial Central Ophthalmic Institute. Second edition. State Medical Publishing House of the U.S.S.R.

In the 2nd edition of this book the number of plates for the differential diagnosis of protanopy, deuteranopy, tritanopy, protanomaly and deuteranomaly has been increased. The colour composition of plates 1 and 2 has been changed to azure and grey and the coloured background into which plates 3, 4, 6 and 12 are set has been enlarged.

The author points out that the range of colour intensities is considerably enlarged compared with the 1st edition.

The plates contain cyphers and geometrical figures such as a circle, triangle and square which are particularly useful in testing children and illiterates.

NOTES

Death

IT is with great regret that we record the death of Professor van Duyse, of Ghent, which occurred on March 25, 1940.

Marnix William van Duyse was born in February, 1885.

As Secretary General of the Société Belge d'Ophtalmologie and also as Secretary General for the International Association for the Prevention of Blindness he was of course well known in this country. van Duyse was Professor of Ophthalmology in the University of Ghent and was a frequent visitor to this country; he often attended the annual congress of the Ophthalmological Society where he was a welcome and honoured guest. He served in the Great War and held numerous distinctions among which may be mentioned the legion d'honneur.

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North of England Ophthalmological Society

AT the Annual Meeting on March 16, 1940, the following members were elected to the Council for the Session 1940-41:—President: Mr. Peter Macdonald; Vice-President: Mr. Bernard Chavasse; Members of Council: Mr. H. R. Bickerton and Mr. N. P. R. Galloway; Treasurer: Mr. W. H. Kiep; Secretary: Mr. Percival J. Hay.

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Irish Ophthalmological Society

THE Annual Meeting of the Irish Ophthalmological Society will be held in Dublin on May 2 and 3. The Montgomery Lecture will be delivered on May 2 by Adams A. McConnell, F.R.C.S.I. Its title is "Pituitary Tumours—their ophthalmological and surgical aspects."

FUTURE ARRANGEMENTS

May 2-3, 1940.—Irish Ophthalmological Society, at Dublin.

May 4, 1940.—North of England Ophthalmological Society, at Newcastle-on-Tyne.

July 4-6, 1940.—Ophthalmological Congress, at Oxford.